
Pneumatic Valves

For precision and control



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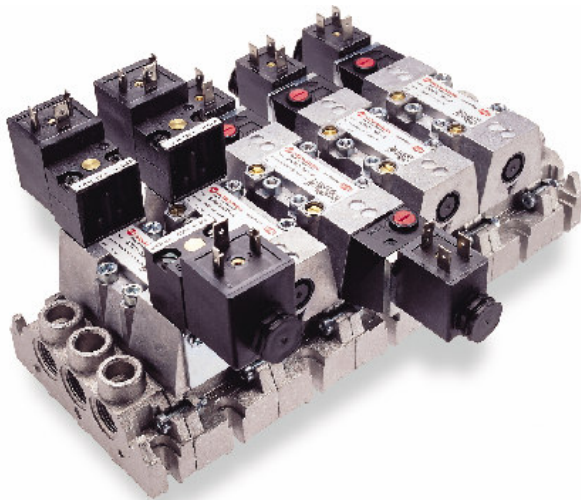
Introduction

- The range of pneumatic valves is vast
- To help select a valve they are placed in a variety of categories:
 - style
 - type
 - design principle
 - type of operator
 - function
 - size
 - application
- For all of them, their basic function is to switch air flow
- From the simplest function of switching a single flow path on and off, to the exacting proportional control of pressure and flow



Style

- **Style reflects the look of a valve range as well as the underlying design principle. Examples are XF, ISO Star and Super X**



Type

- **Type refers to the valves installation arrangement for example sub-base, manifold, in line, and valve island**



Operators

- An operator is the mechanism that causes a valve to change state
- They are classified as manual, mechanical and electrical



Push Button



Shrouded Button



Mushroom Button



Twist



Switch



Emergency Stop



Key Released



Key Operated



Plunger



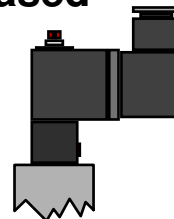
Roller



One Way Tip



Air Pilot



Solenoid Pilot



NORGREN

VALVE FUNCTION

Behind all the choices in ours and our competitors ranges is one simple point.

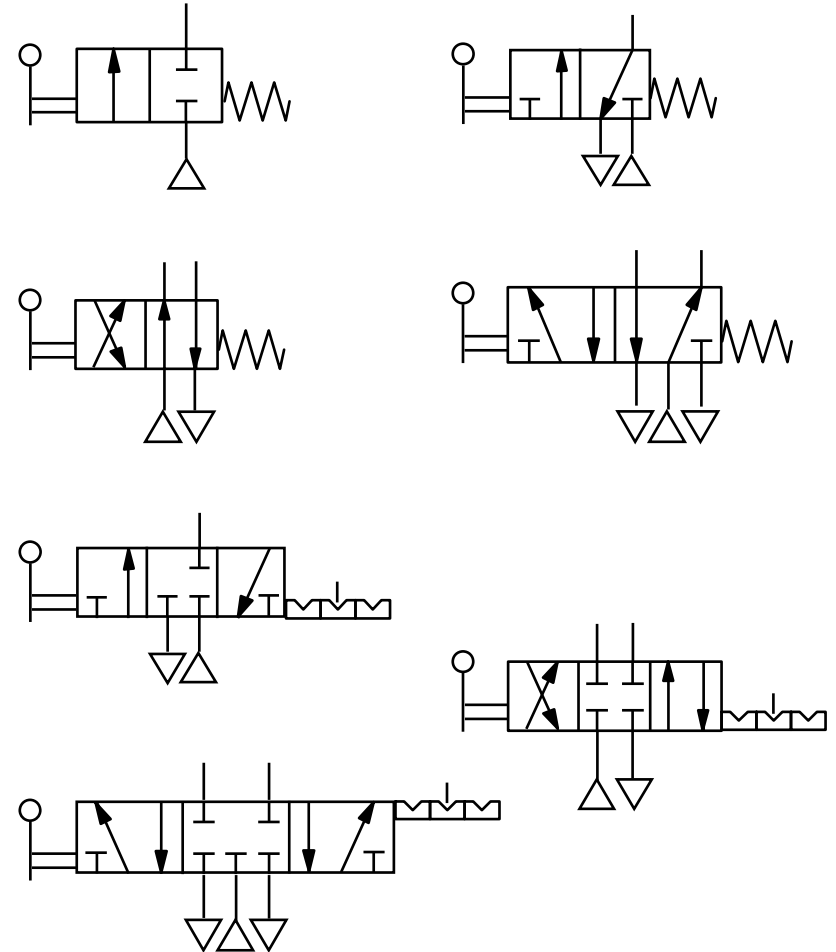
A valve fundamentally is used to BLOCK or DIVERT the path of compressed air, water, fluids or steam in order to influence a task or process.

Flow control and Proportional valves are an extension of this in that they influence flow and force.



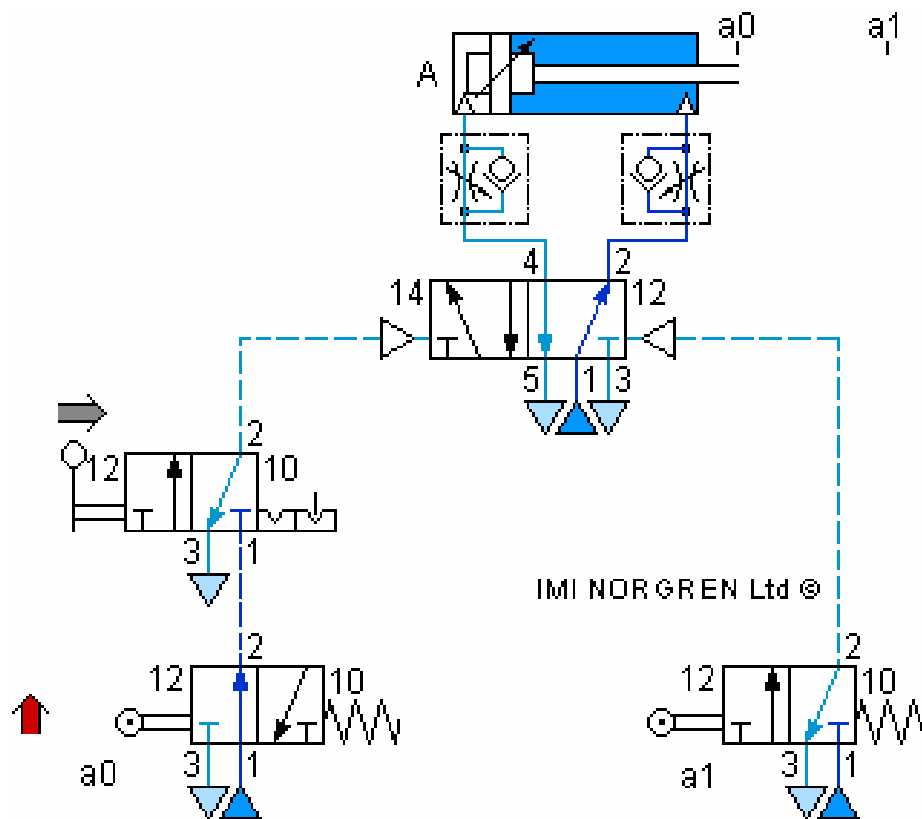
Valve Function

- **Function is the switching complexity of a valve**
- **Shown by two figures 2/2, 3/2, 4/2, 5/2, 3/3, 4/3 & 5/3**
- **First figure is the number of main ports. Inlets, outlets, and exhausts excluding signal and external pilot supplies**
- **Second figure is the number of states**
- **A 3/2 valve has 3 ports, and 2 states, normal and operated.**



Valve Function

- Combination of valve function determines complexity of control circuit logic



Design

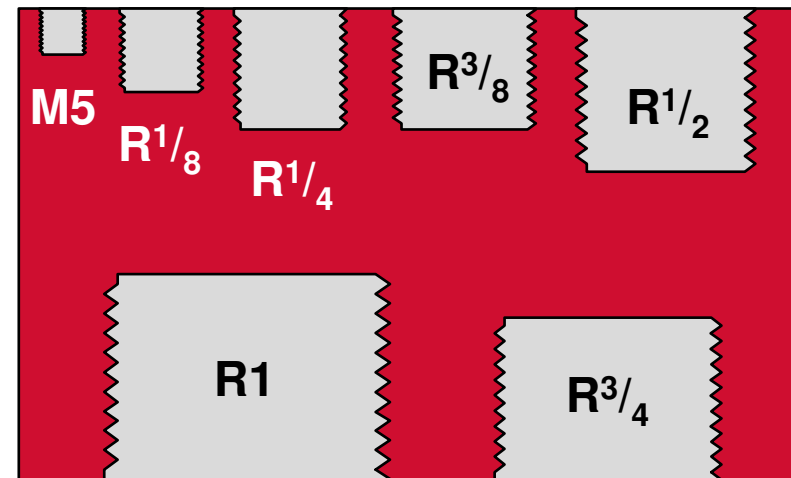
- Design refers to the principle of operation around which the valve has been designed, for example, spool valve, poppet valve and plate valve



Valve Size

- Size refers to a valve's port thread.
- For similarly designed valves the amount of air flow through the valve usually increases with the port size.
- Port size alone however cannot be relied upon to give a standard value of flow as this is dependent on the design of the valve internals.

- The port size progression M5, R $\frac{1}{8}$, R $\frac{1}{4}$, R $\frac{3}{8}$, R $\frac{1}{2}$, R $\frac{3}{4}$, R1.



Application

- **Application is a category for valves described by their function or task**
 - **Examples of specialist valves are quick exhaust valve, soft start valve and monitored dump valve**
 - **Examples of standard valves are power valves, logic valves, signal processing valves and fail safe valves**
- **A standard valve could be in any category depending on the function it has been selected for in a system**

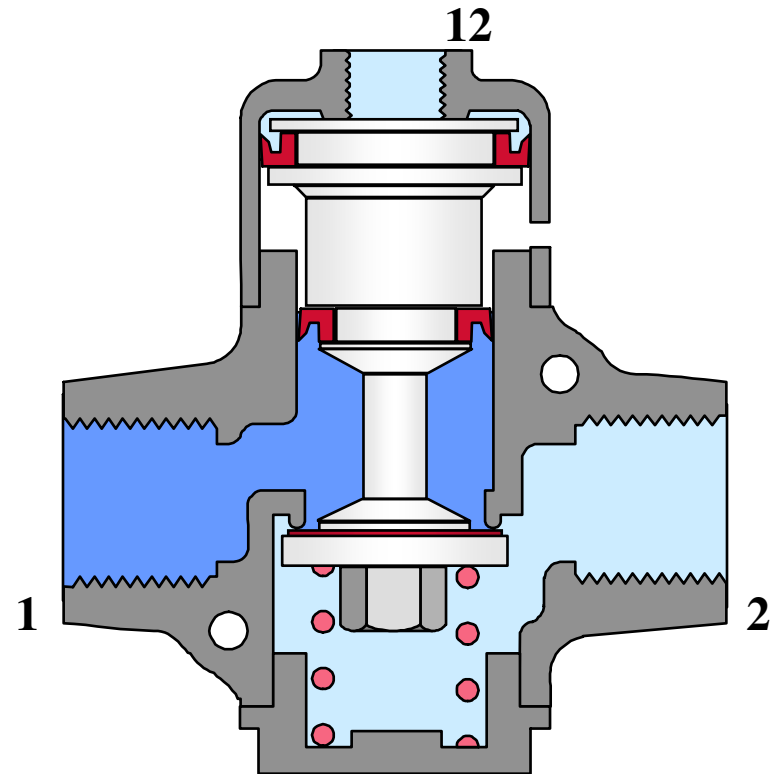


2/2 VALVE

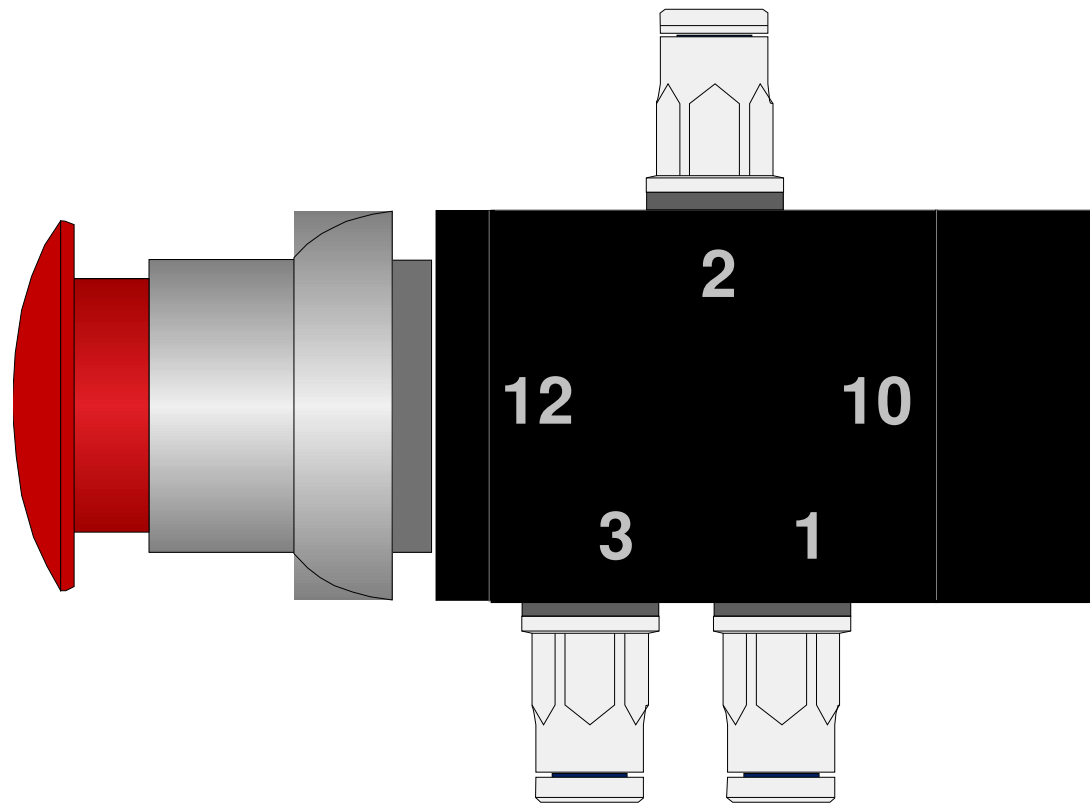


2/2 POPPET VALVE

- 2 ports 2 positions
- A 2/2 valve is usually used as a simple on/off function
- Here the valve is in essence a plunger or poppet with a seal acting against a spring



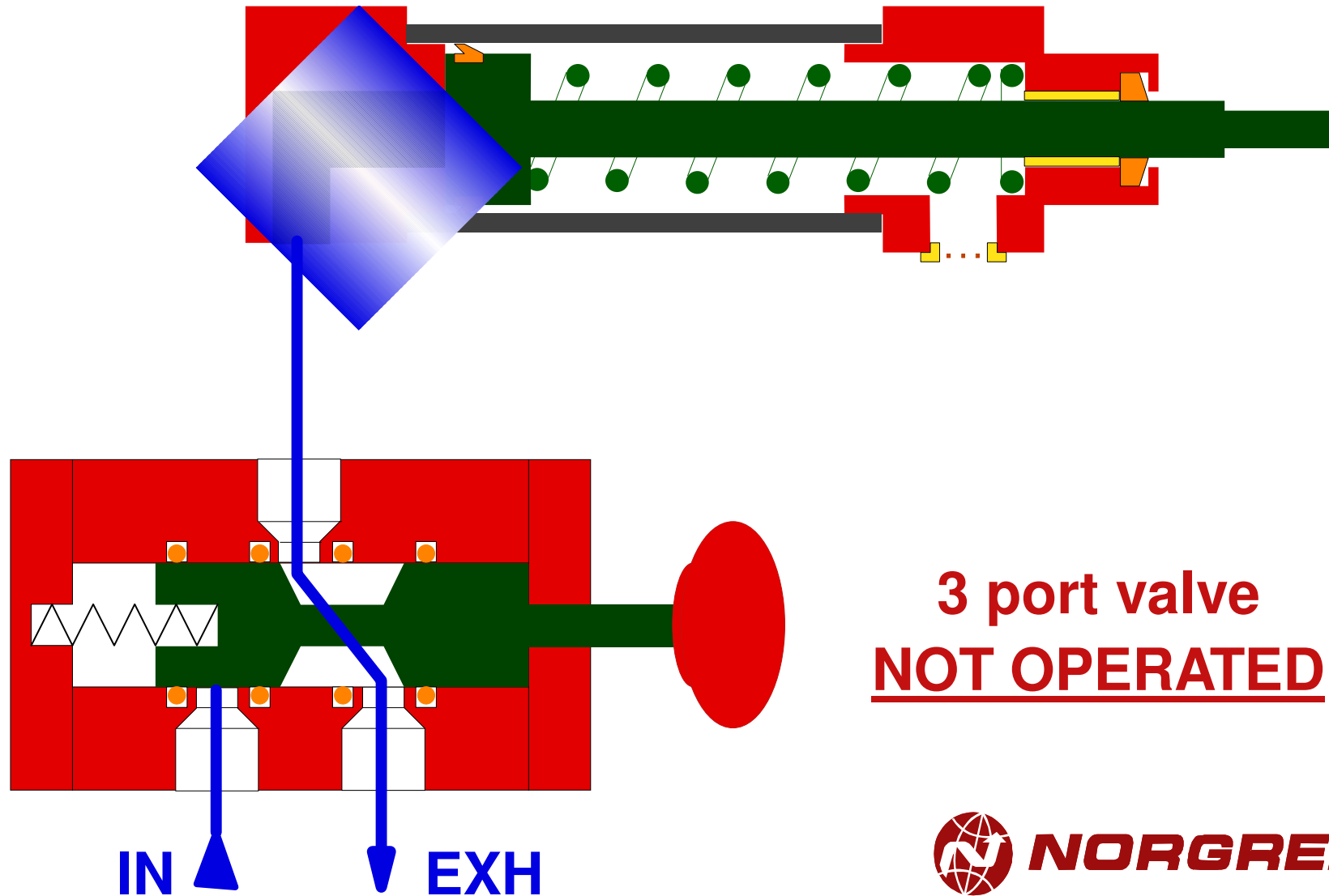
3/2 VALVE



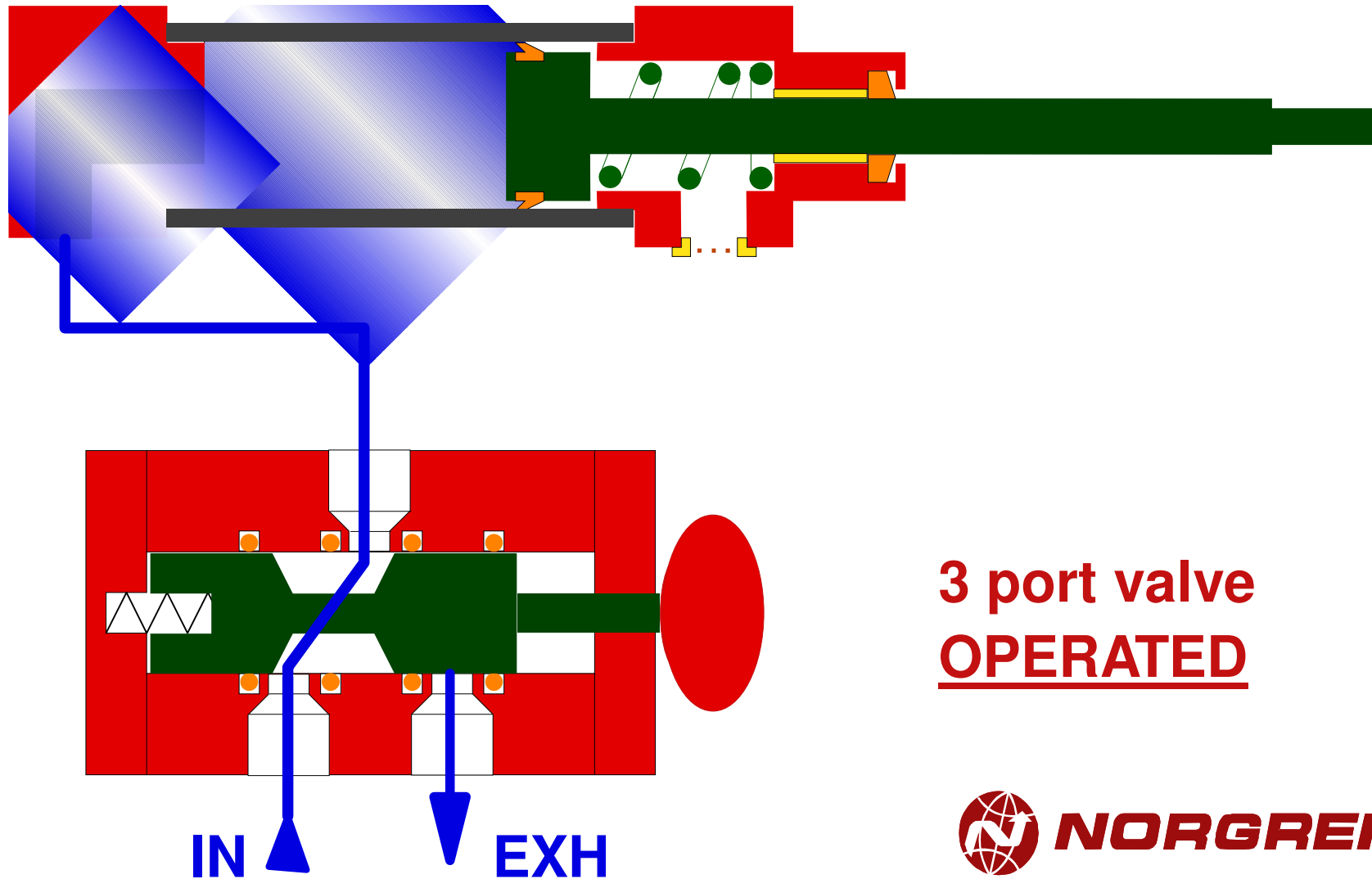
3/2 VALVE

- **3 ports 2 positions**
- **A 3/2 valve is the next step up from the 2/2**
- **The valve is not only just on or off it also allows another path through it to enable air to exhaust**
- **It is available in both poppet and spool designs**
- **The best way to show its function is in the operation of a single acting or spring return cylinder**

3/2 VALVE PRINCIPLE



3/2 VALVE PRINCIPLE

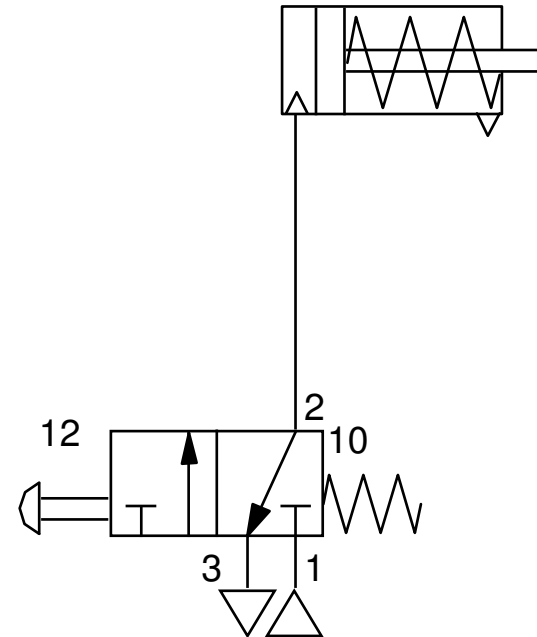


3 port valve
OPERATED



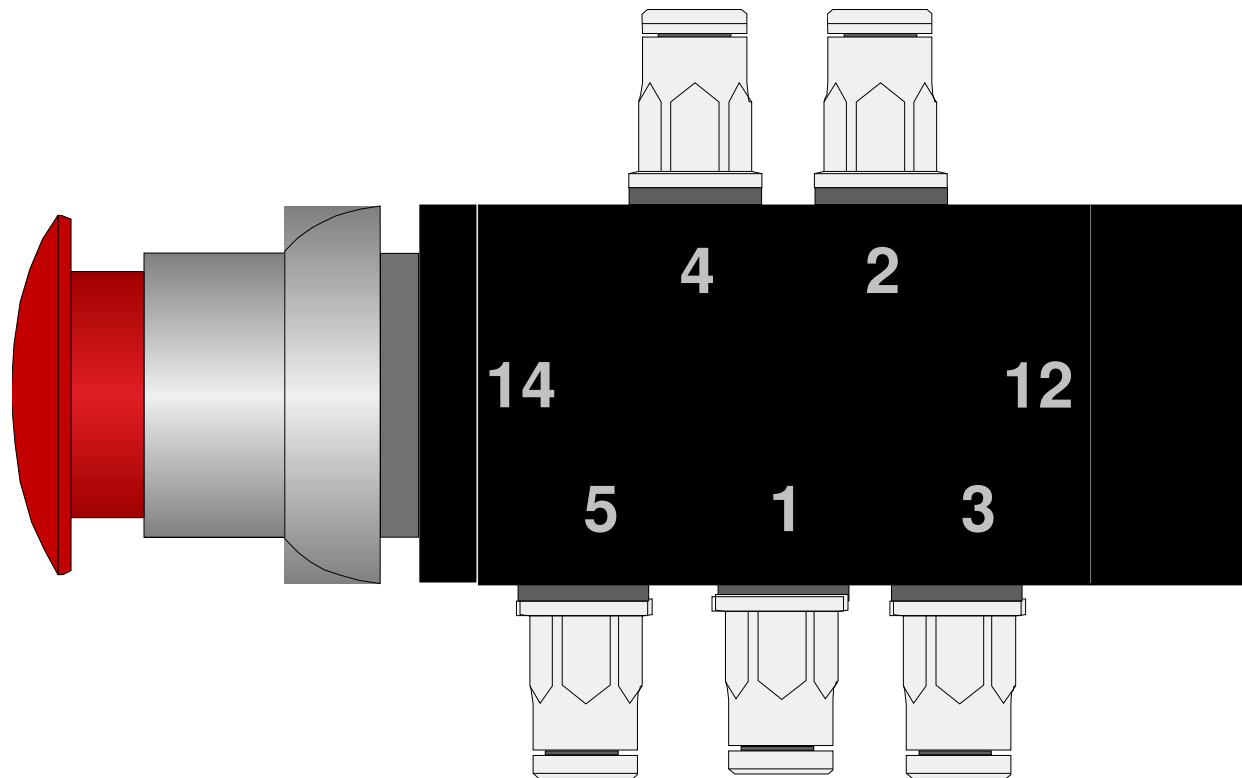
Actuator Control (3/2 valve)

- A 3 port valve provides the inlet, outlet and exhaust path and is the normal choice for control of a single acting cylinder
- In the normal position produced by the spring, the valve is closed
- In the operated position produced by the push button the valve is open
- The push button must be held down for as long as the cylinder is outstroked



-
- The diagram illustrates a hydraulic circuit. At the top, a pump is represented by a triangle inside a circle, connected to a horizontal line. This line leads to a 4/3-way directional control valve, depicted as a rectangle with four ports. The valve is currently in its center position, indicated by a diagonal line from the top-left to the bottom-right. The valve's ports are labeled: '12' on the left (pump inlet), '10' on the right (cylinder inlet), '3' at the bottom-left (return to tank), and '1' at the bottom-right (return to tank). A spring symbol is shown on the right side of the valve, indicating it is a spring-centered valve. The valve is connected to a hydraulic cylinder at the bottom, shown as a rectangle with a diagonal line representing the piston rod. The cylinder has two ports: '2' at the top (connected to the valve's '10' port) and '1' at the bottom (connected to the valve's '1' port). A spring symbol is also shown on the right side of the cylinder, indicating it is a spring-centered cylinder. The cylinder is connected to a horizontal line on the right, which leads to a pump symbol (triangle in a circle) with a spring symbol on its right side, indicating it is a spring-centered pump.

5/2 VALVE

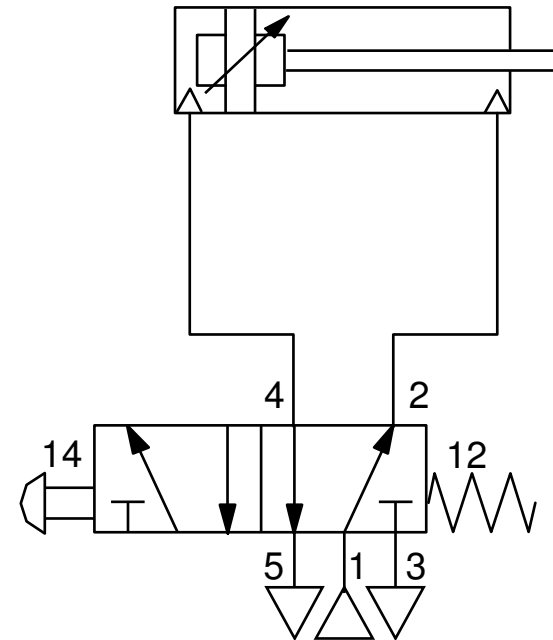


5/2 VALVE

- 5 ports 2 positions
- A 5/2 valve is the next step up from the 3/2
- The valve enables air passage to be swapped between two ports each with a corresponding exhaust path
- The best way to show its function is in the operation of a double acting cylinder

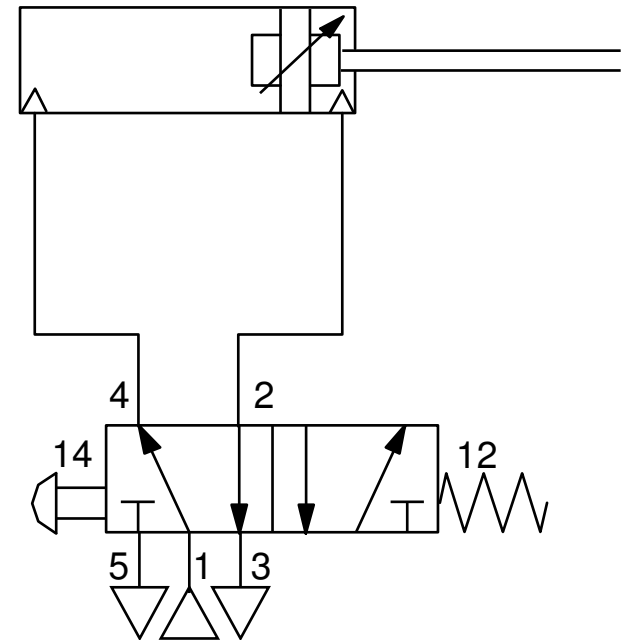
Actuator Control (5/2 valve)

- A five port valve provides an inlet port 1 that is switched between two outlet ports 2 and 4 each with an exhaust port 3 & 5
- In the normal position produced by the spring 1 is connected to 2 with 4 to exhaust 5
- In the operated position produced by pushing the button port 1 is connected to 4 with 2 to exhaust 3



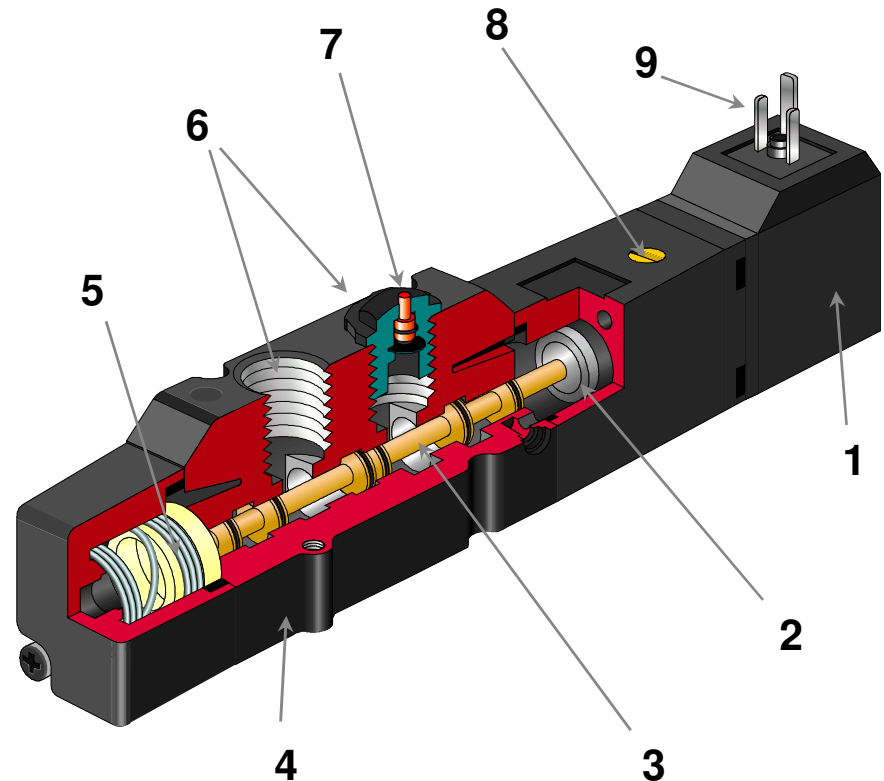
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Typical Valve

- Identification of the component parts of a typical 5/2 solenoid valve with spring return (Sub-base not shown)
 - (1) Solenoid (15mm)
 - (2) Piston
 - (3) Spool with disc seals
 - (4) Valve body
 - (5) Return spring
 - (6) Alternative ports 2, 4
 - (7) Pressure indicator
 - (8) Manual override
 - (9) Electric connectors

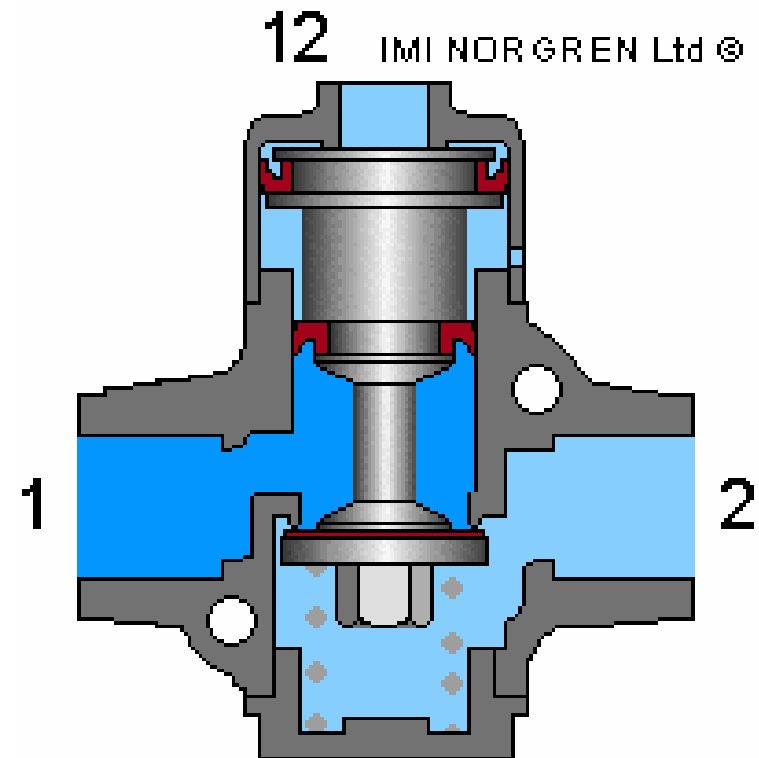


Poppet Valves



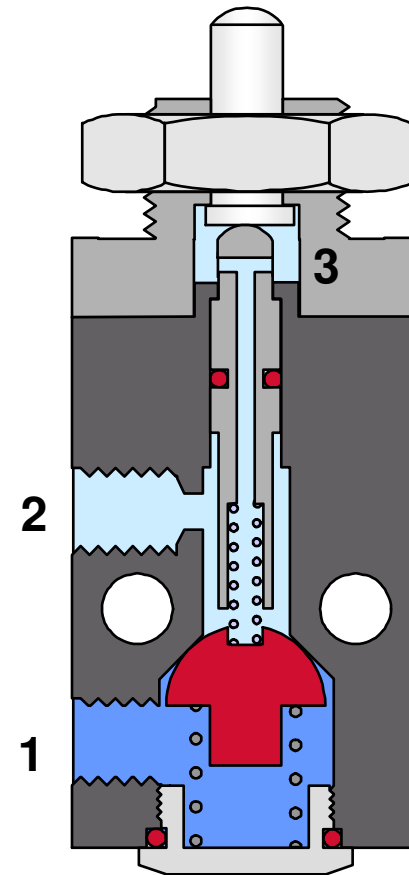
Poppet Valve 2/2

- The Poppet valve is a simple and effective design used mainly in 2/2 and 3/2 functions
- It has good sealing characteristics and can often be the choice for a supply shut off valve
- A poppet seal has a butt action against a raised edged aperture
- Illustrated is a 2/2 air operated poppet valve



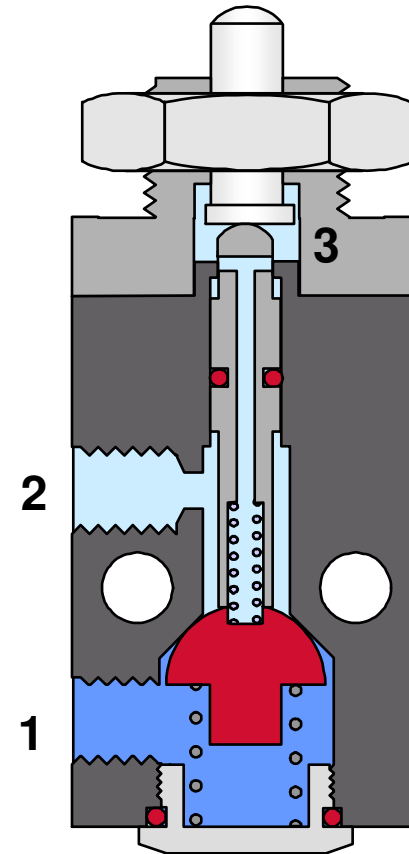
Poppet Valve 3/2

- Miniature 3/2 valve used for generating signals
- The poppet seal will give long life (not subjected to sliding friction)
- Supply to port 1 assists the spring to hold the poppet shut
- Outlet port 2 is connected through the plunger to a plain exhaust port
- When operated exhaust path sealed and poppet opened (flow 1 to 2)



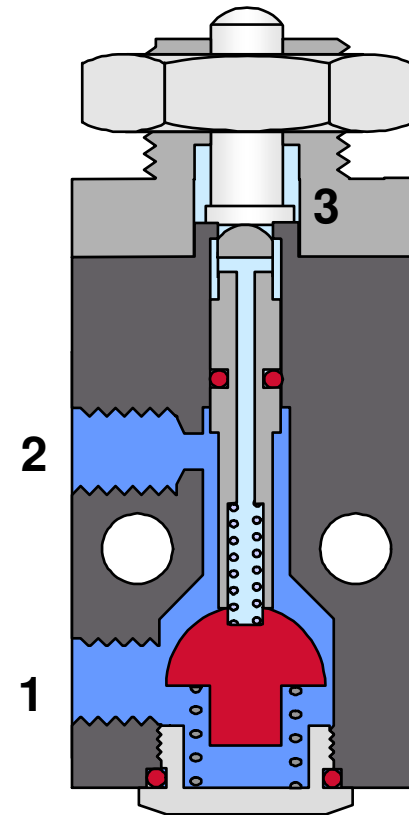
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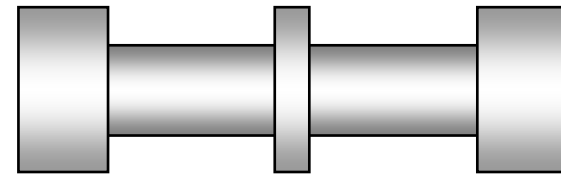
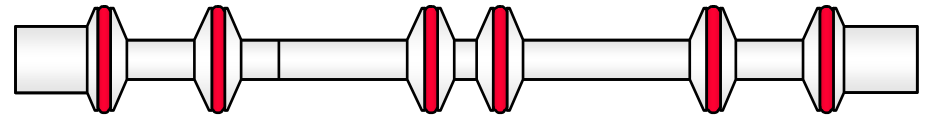
Spool Valves

- A long standing popular versatile design
- Available in most functions 3/2, 3/3, 5/2, 5/3, etc.
- Fully force balanced
- Wide range of styles, sizes, operators and mounting arrangements
- Suit a multiple range of applications



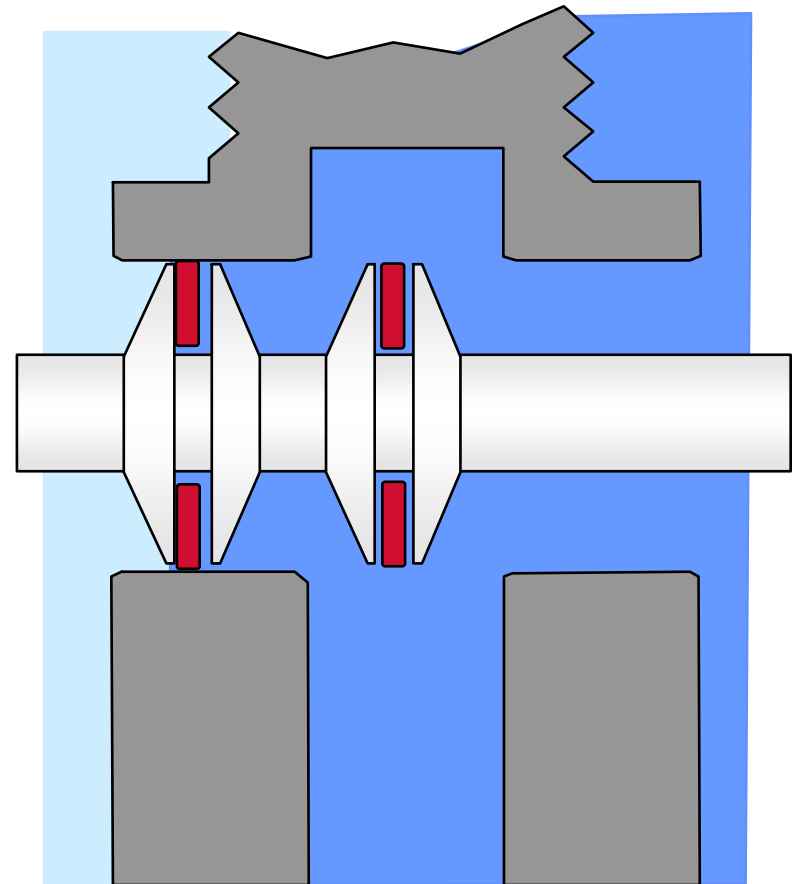
Spool Types

- A spool has a number of major and minor diameters called lands and valleys
- The lands seal with the valve bore and the valleys connect valve ports to control flow direction
- Dynamic seal type has the seals on the spool
- Glandless type have no sliding seals
- Static seal type has the seals fixed in the valve bore



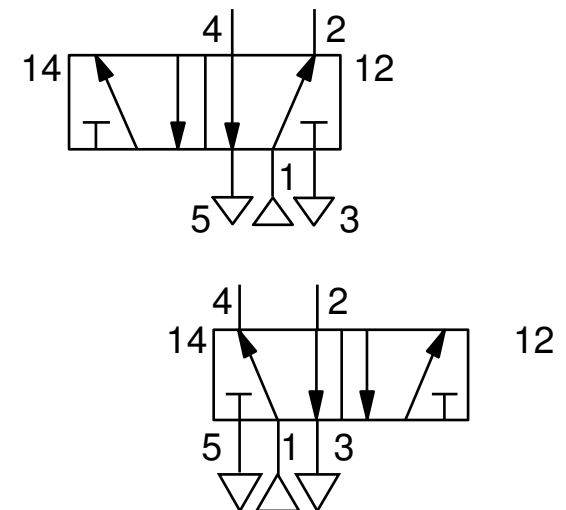
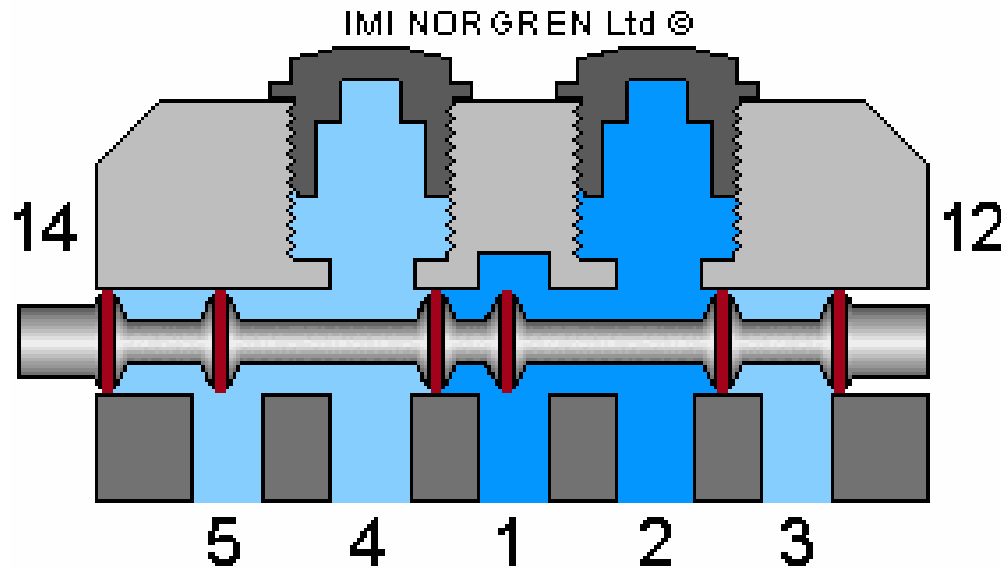
Disc Seals

- A disc seal is a loose fit in the groove, with the outer diameter just in contact with the valve bore.
- Under differential pressure the disc seal is pushed sideways and outwards to seal the clearance between the outer diameter of the piston and the valve bore
- The slim profile gives low radial force therefore reducing friction



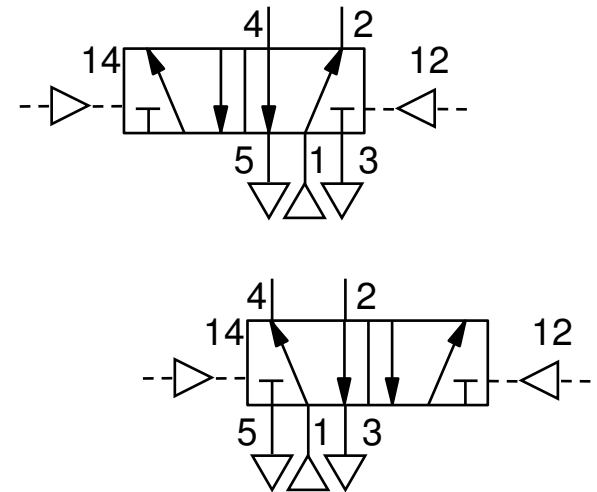
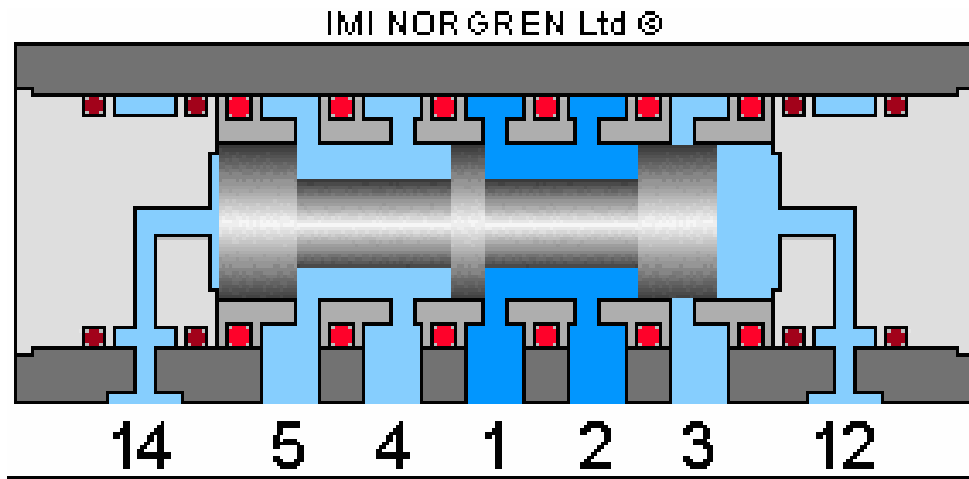
Spool Valve (dynamic seals)

- This 5/2 valve has a spool fitted with disc seals
- The seals move with the spool therefore they are called dynamic
- Normal position: port 1 is joined to 4 and 2 is joined to 3
- Operated position: port 1 is joined to 2 and 4 is joined to 5



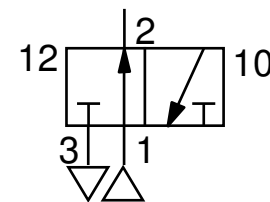
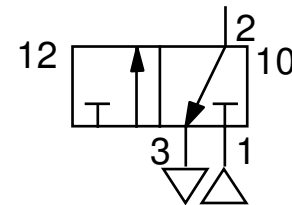
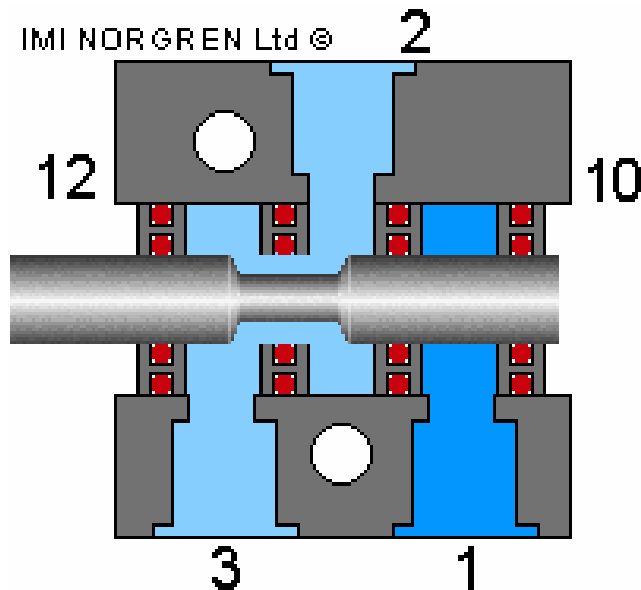
Spool Valve (glandless)

- This 5/2 valve has a matched spool and sleeve. The fit is so precise that seals between them are unnecessary
- The tiny amount of air crossing the spool lands provides an air bearing
- The result is low friction and long life



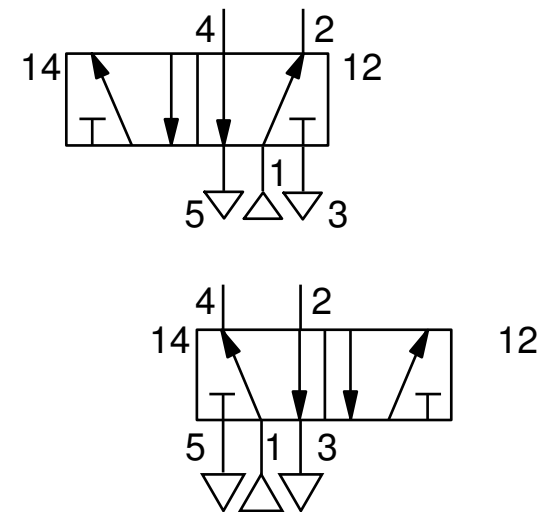
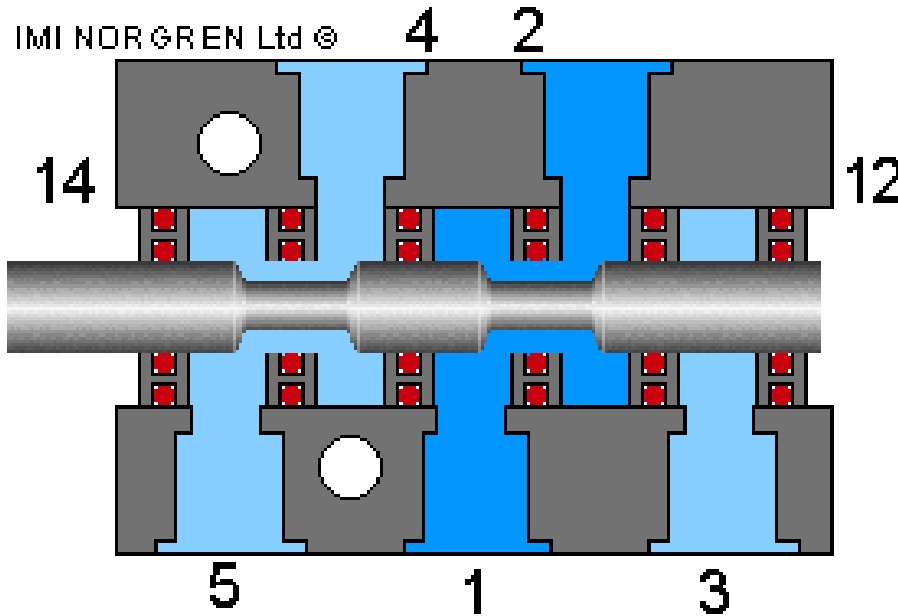
Spool Valve (static seals)

- This 3/2 valve has a plain spool sliding within static seals
- The O Ring seals are held in carriers fixed in the valve bore and positioned by spacers (not shown)
- The larger O Rings seal the valve bore with the carriers
- The smaller O Rings seal the carriers with the spool



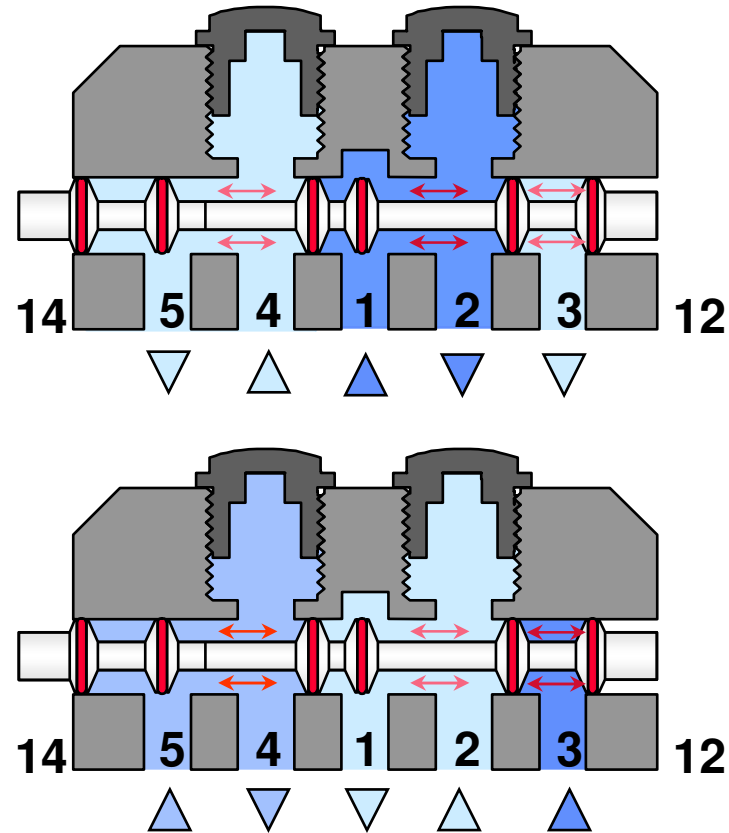
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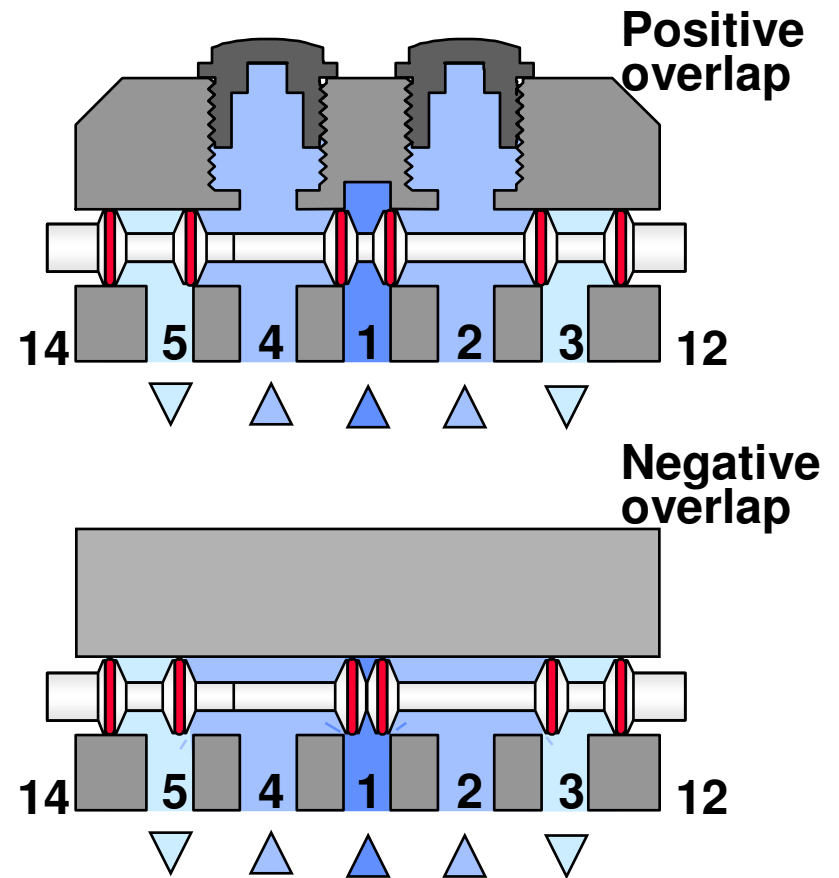
Balanced Spool

- The pressure acting at any port will not cause the spool to move
- The areas to the left and right are equal and will produce equal and opposite forces
- Balanced spool valves have a wide range of application as any selection of pressures can be applied to the 5 ports. Single pressure and twin pressure supply versions shown



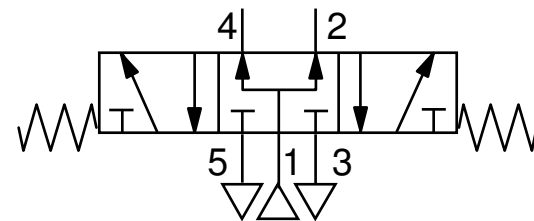
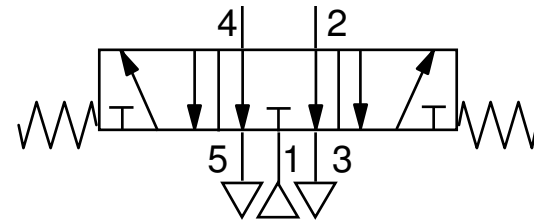
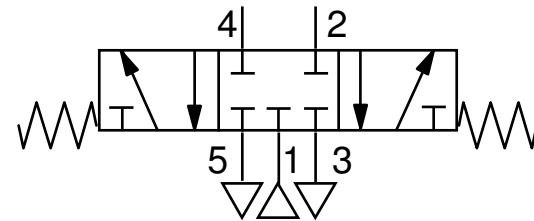
Overlap

- Most spool valves are designed with a positive overlap
- When the spool is in transit from the normal to the operated state port 2 will be closed before port 4 is opened (or 4 before 2)
- If the spool is being moved slowly a negative overlap will cause pressure loss during the spool changeover and may even stall



Three Position Spool Valves

- This type of valve has a normal state where the spool is in a mid position
- The characteristic in the centre position is determined by the land spacings on the spool
- The three types are:
 - All ports blocked
 - Open exhausts
 - Open pressure

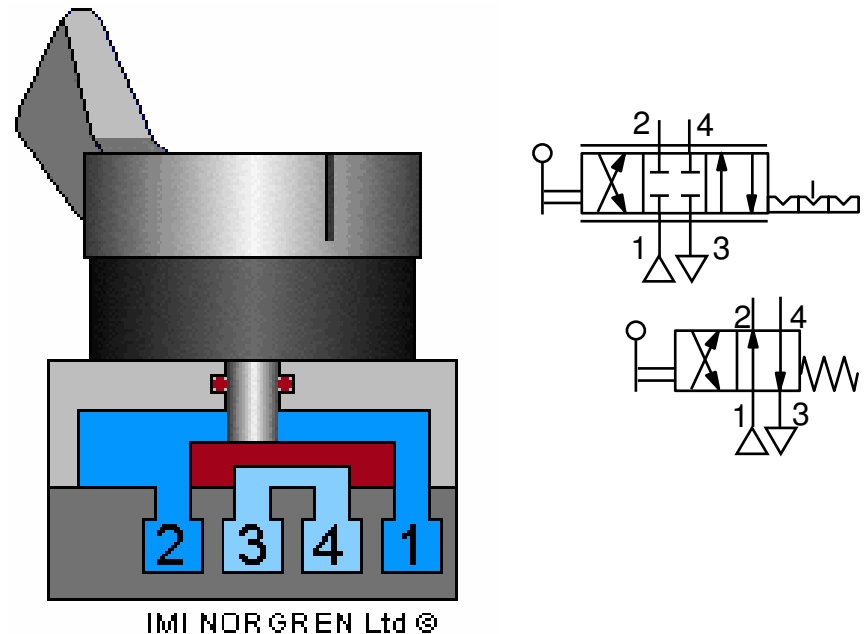


Other Valve Designs



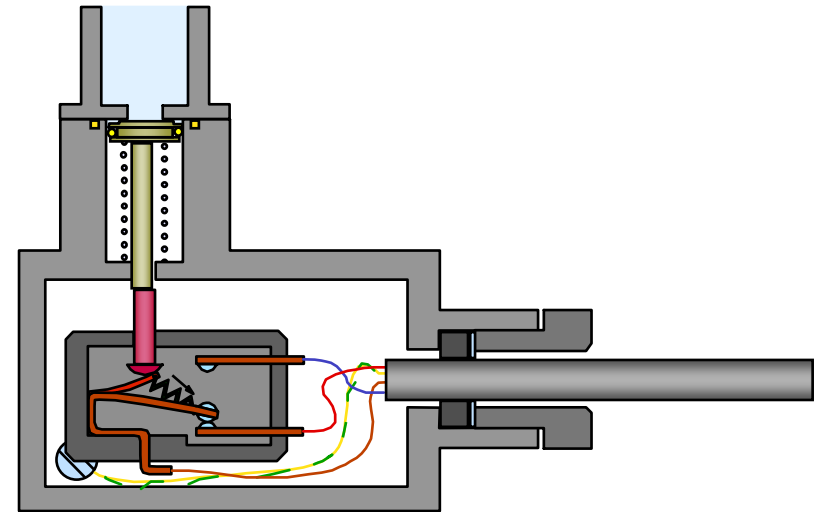
Plate Valves

- Have no sliding synthetic rubber seals
- The rotary slide (red) is ground flat with the base
- Pressure supplied at port 1 pushes the plate down to seal, also supplies outlet port 2
- The cavity in the plate connects outlet port 4 to exhaust port 3
- When operated the plate swings to connect port 2 to exhaust 3 and 1 to 4
- Versions 4/2 and 4/3 with detented centre position
- Part movement of lever will give flow control



Pressure Switches (electrical)

- This fixed value example uses a built in single acting cylinder to operate a standard changeover microswitch
- The operating pressure is about 3 bar this needs to overcome the combined force of the cylinder and microswitch springs
- Adjustable pressure switches are also available



Pressure Switches (electrical) - Range



**18 D Pneumatic
Pressure Switch**



**33 D Electronic
Pressure Switch**

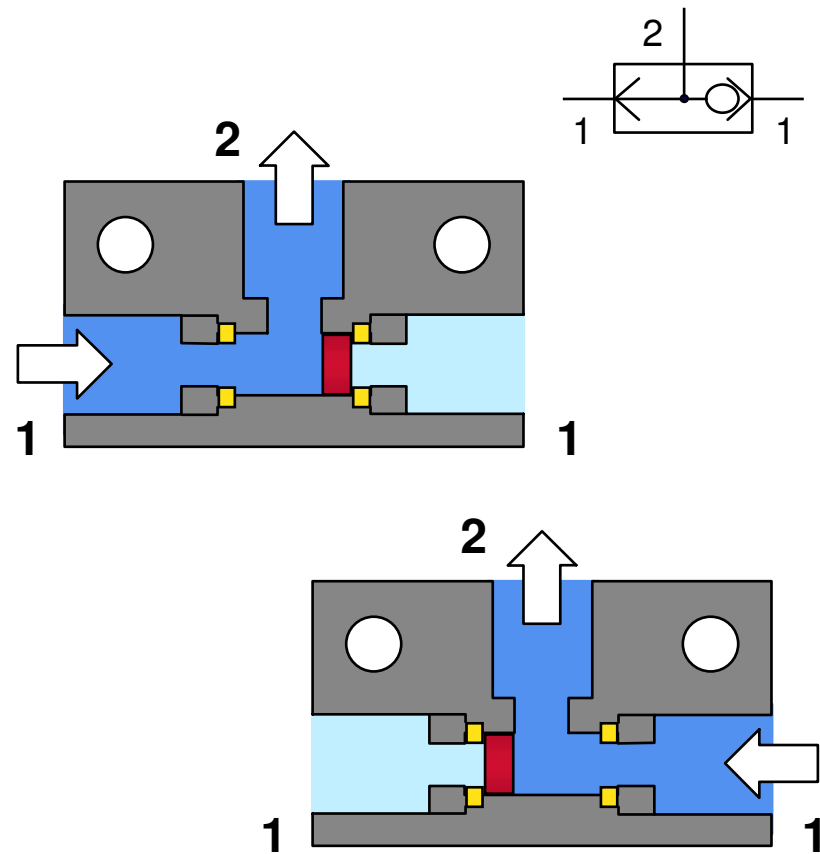


**4246-51 - Excelon Sub-base
Mounted Pressure Switch**



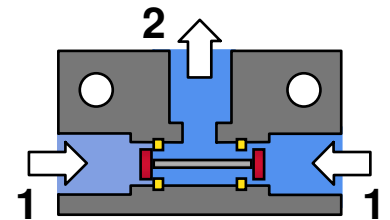
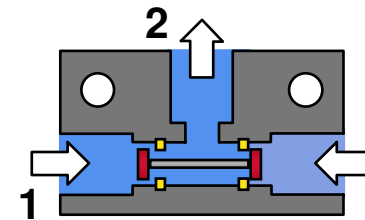
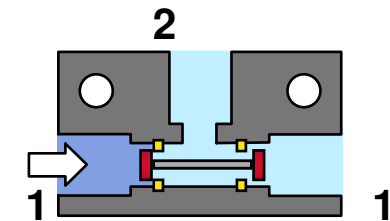
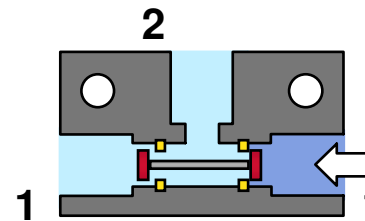
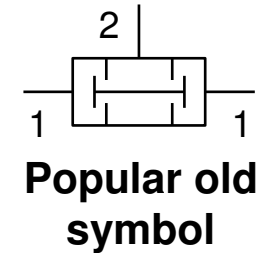
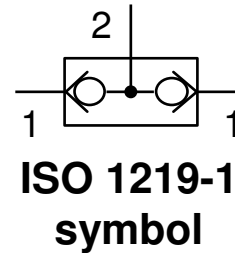
Logic “OR” Shuttle Valve

- An air signal given to either the left hand port 1 or the right hand port 1 will result in an output at port 2
- The sealing disc moves across to seal the exhaust signal line to prevent loss of signal pressure



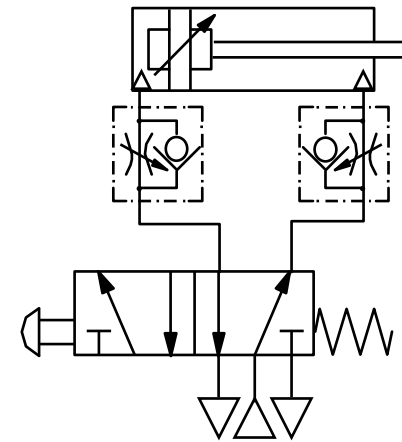
Logic “AND” Shuttle Valve

- A single air signal at either of the ports 1 will cause the shuttle to move and block the signal
- If a signals are applied at both the left hand AND right hand ports 1 only one of them will be blocked the other will be given as an output at port 2
- If the pressures are not equal the one with the lowest pressure is switched



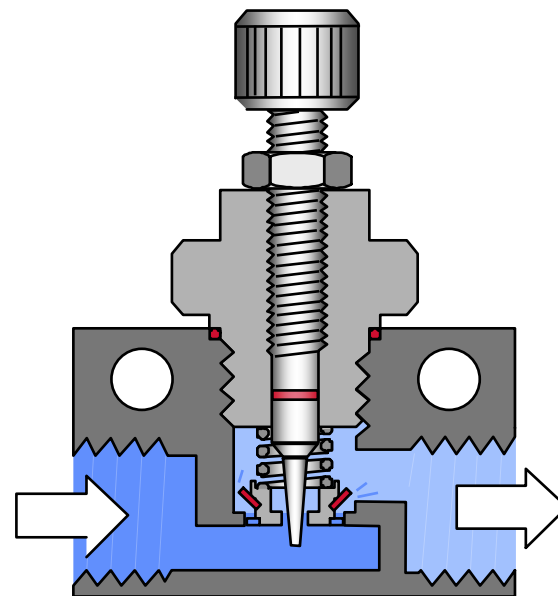
Flow Regulation

- By the use of flow regulators the outstroke speed and instroke speed of a piston rod can be independently adjusted
- Speed is regulated by controlling the flow of air to exhaust
- The front port regulator controls the outstroke speed and the rear port regulator controls the instroke speed



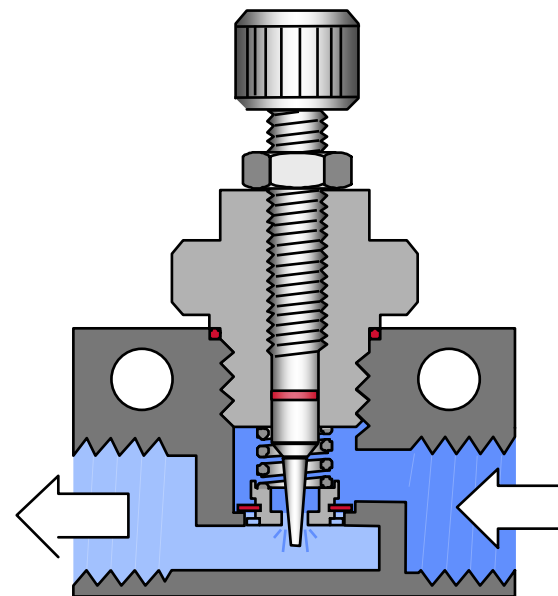
Flow Regulator

- **Uni-directional, line mounted adjustable flow regulator**
 - Free flow in one direction
 - Adjustable restricted flow in the other direction



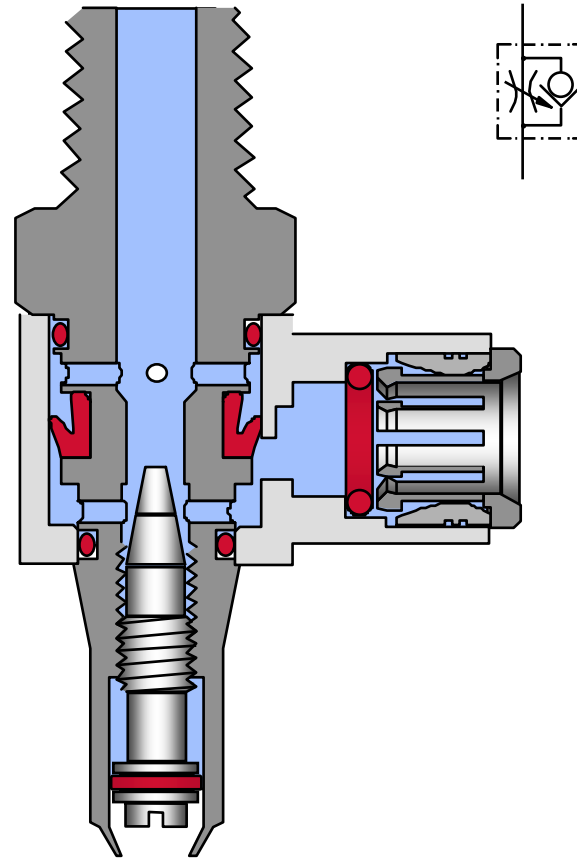
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Banjo Flow Regulator

- Designed to fit directly in to cylinder ports, so placing adjustment at the appropriate cylinder end
- Two types:
 - One to give conventional flow restriction out of the cylinder and free flow in (as illustrated)
 - The other type to give restricted flow in to the cylinder and free flow out (not illustrated)



Flow Regulator - Core Range



**10TA Series
Banjo Flow
Regulator**

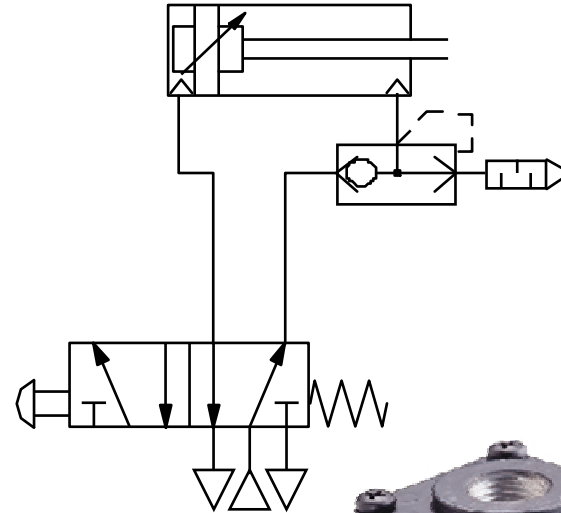


**T1000 Series
Uni-Directional
Flow Regulator**



Quick Exhaust Valve

- In some applications cylinder speed can be increased by 50% when using a quick exhaust valve
- When operated, air from the front of the cylinder exhausts directly through the quick exhaust valve
- The faster exhaust gives a lower back pressure in the cylinder therefore a higher pressure differential to drive out the piston rod

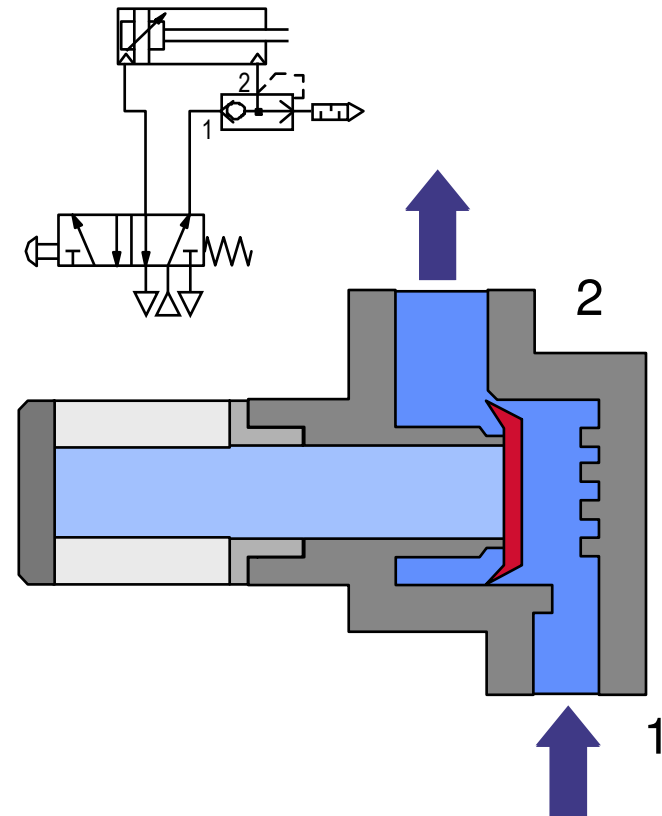


T70 Series



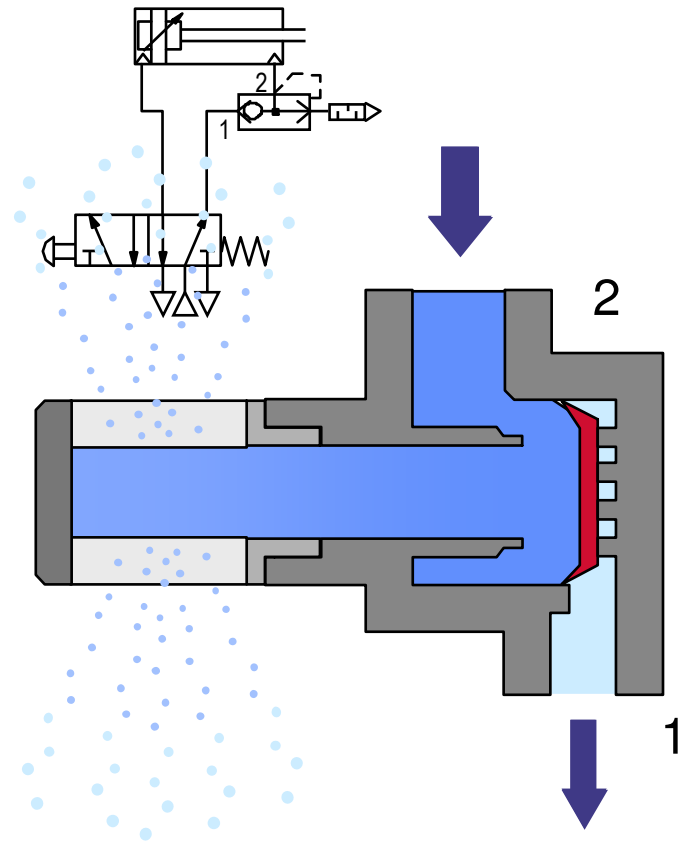
Quick Exhaust Valve

- Port 2 is connected directly to the end cover of a cylinder
- Port 1 receives air from the control valve
- Air flows past the lips of the seal to drive the cylinder
- When the control valve is exhausted, the seal flips to the right opening the large direct flow path
- Air is exhausted very rapidly from the cylinder for increased speed



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- Air is exhausted very rapidly from the cylinder for increased speed



Filtration and Lubrication

- Valves should be supplied with clean dry air with or without lubrication
- Water droplets and solid particle removal using a standard 40μ filter will normally be sufficient
- Valves are greased when manufactured, this alone will give a long lifetime to the seals and valve bore
- If the air carries additional lubrication from a micro-fog lubricator the normal life of the valve will be extended
- If air is process dried to a very low dewpoint lubrication is necessary
- For extreme high or low operating temperatures lubrication is necessary



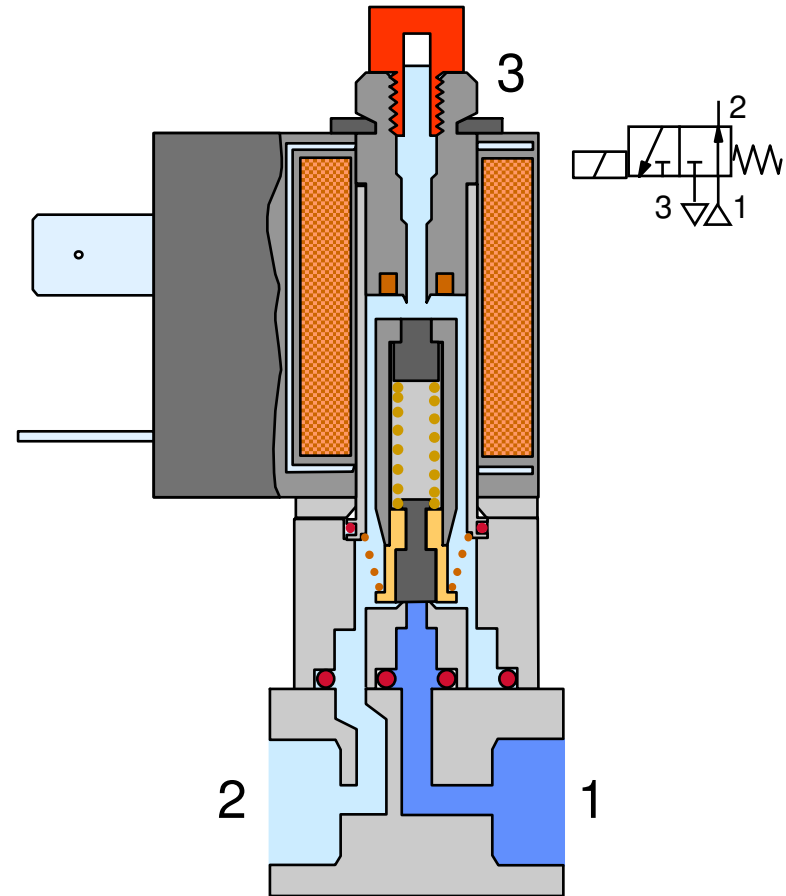
Solenoid Valves

- Solenoid valves are electro-pneumatic relays
- The state of an electrical input controls the state of a pneumatic output
- Solenoid valves are the interface between electronic control systems and pneumatic power
- Types are:
 - Direct acting
 - Pilot operated
 - Proportional



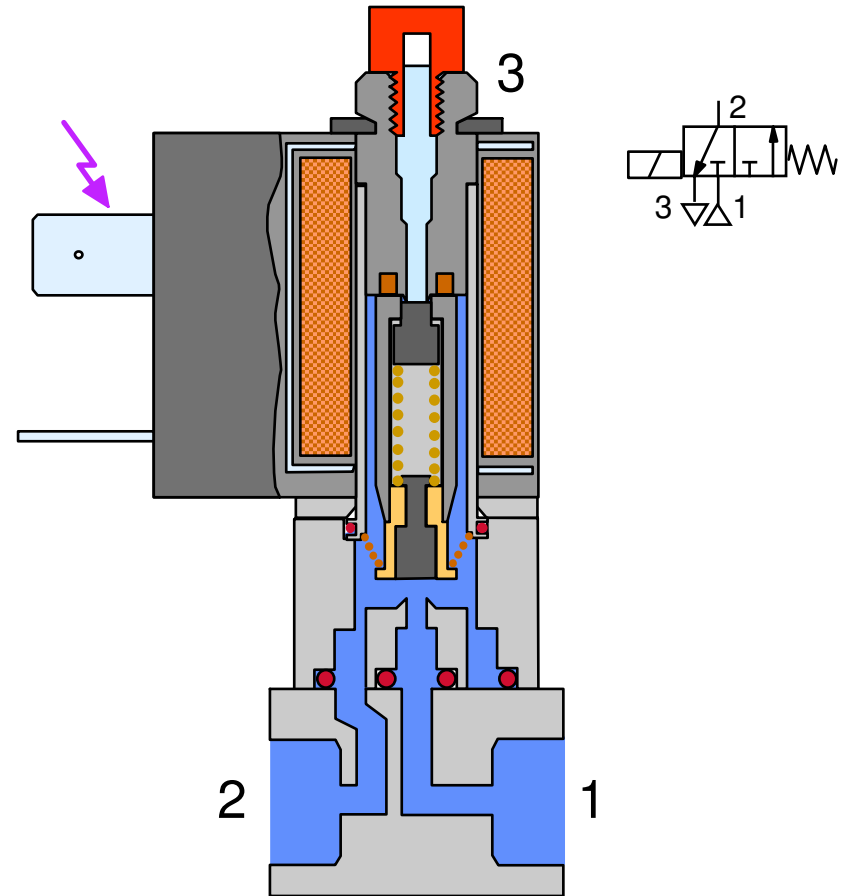
Principle of operation

- The double poppet armature is held by a spring against the inlet orifice sealing the supply at port 1
- Outlet port 2 is connected to exhaust port 3
- When the coil is energised the armature is pulled up closing the exhaust orifice and connecting the supply port 1 to the outlet port 2



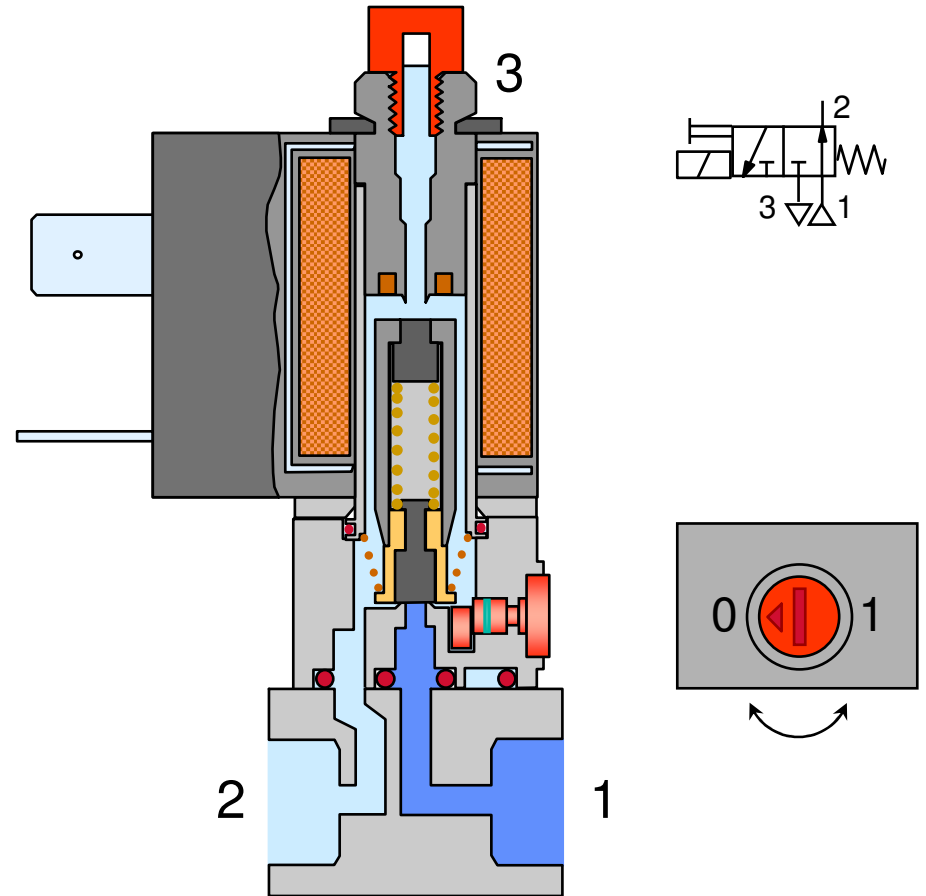
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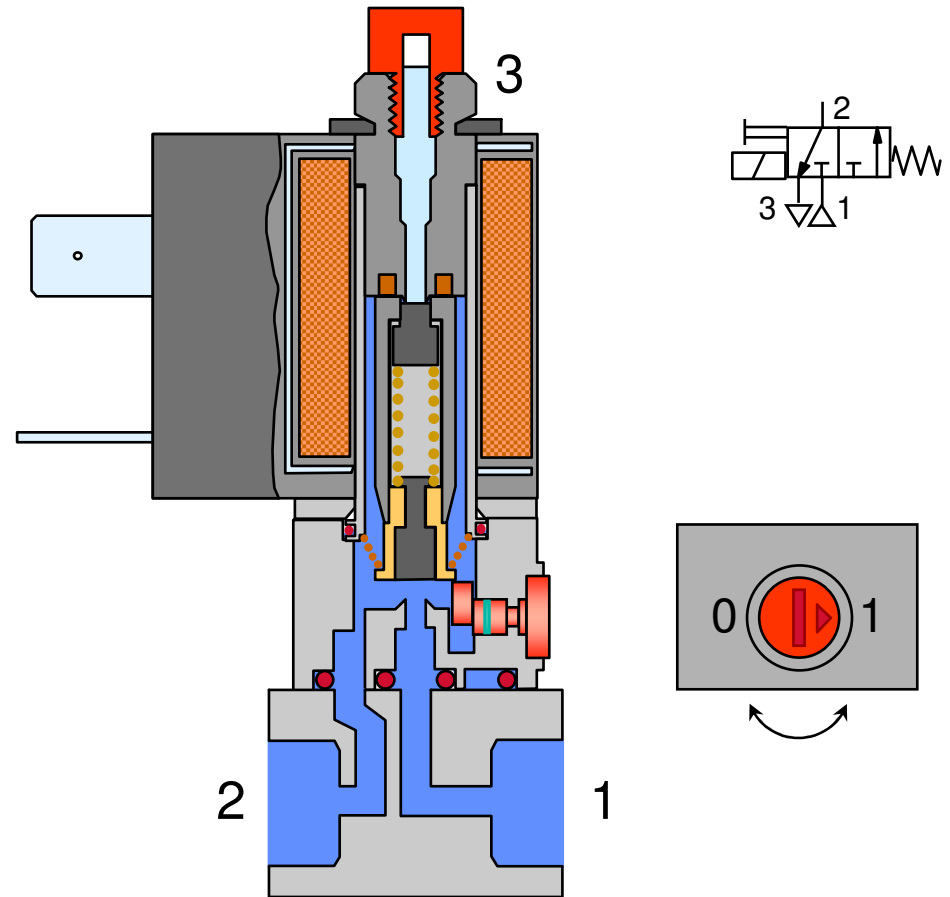
Manual Override

- To test during set up or maintenance without energising the coil
- In position 0 the armature is in the normal closed position
- Turning the cam with a screwdriver to position 1 lifts the armature to operate the valve
- Important to return to position 0 before the machine is restarted



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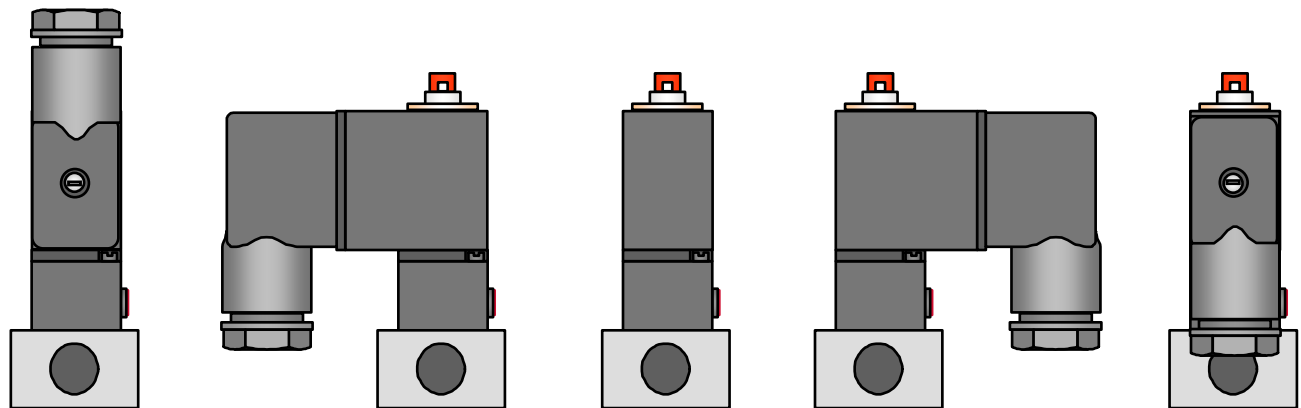
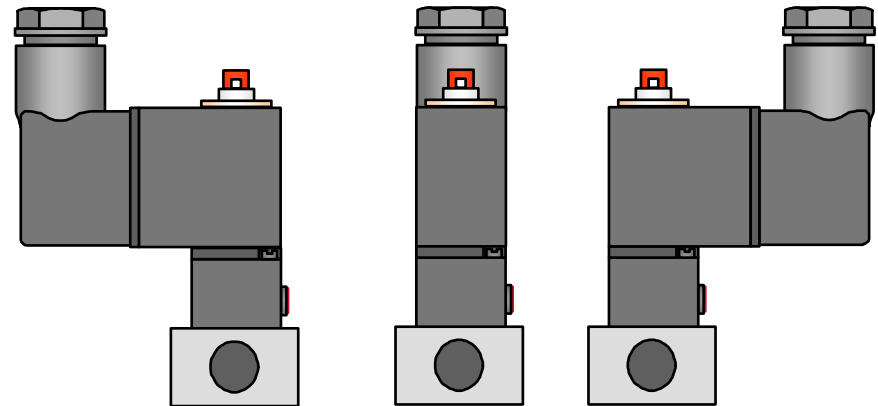
Direct Acting Solenoid Valves

- The design is a balance between quantity of air flow (orifice diameter) and electrical power consumed
- The higher the air flow, the larger the inlet orifice
- The larger the orifice, the stronger the spring
- The stronger the spring, the greater the power of the magnetic field
- The greater the field, the higher the electrical power consumption
- The desire for low electrical power for direct interface with PLC's and other electronic devices makes this design of valve ideal
- The range offers a variety of orifice sizes and electrical power ratings
- This design is used alone and as an integrated pilot to operate larger valves



Cable Entry

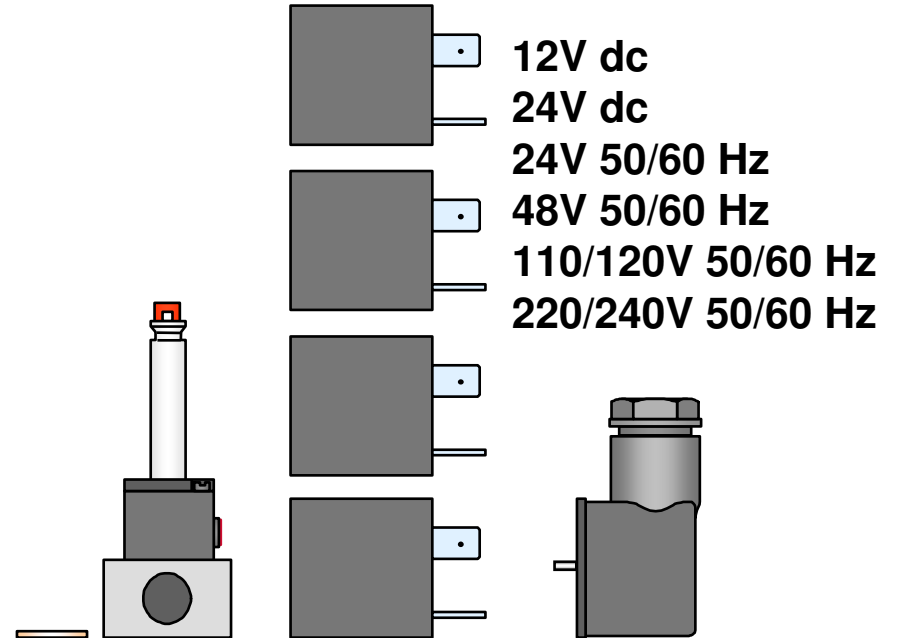
- To provide a choice of cable entry orientation, the coil can be fixed in 90° alternative positions and the plug housing in 180° alternative positions



Interchangeable Coils

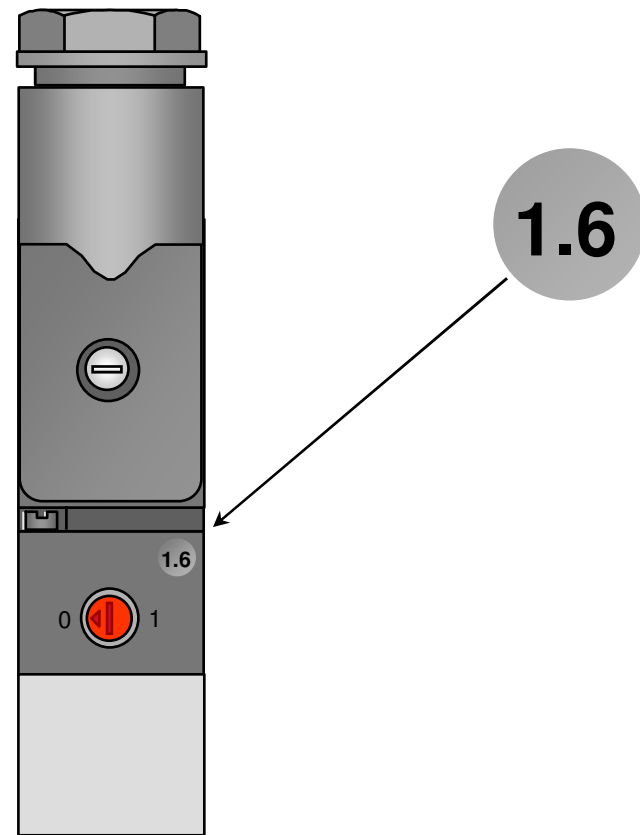
- A solenoid valve is designed to work with both AC and DC
- A coil of any voltage AC or DC of the same power can be fitted or exchanged on the same stem
- **Important.** Low and high power coils cannot be exchanged. The orifice diameter and spring strength must match the coil power

- 100% E.D. The coil can be energised continuously



Flow and Power Rating

- To help identify the solenoid valve body, the orifice diameter is marked in the position shown
- 12V dc
24V dc
24V 50/60 Hz
48V 50/60 Hz
110/120V 50/60 Hz
220/240V 50/60 Hz
- 2W = 1.0mm orifice diameter
6W = 1.6mm orifice diameter
8VA = 1.6mm orifice diameter



Norgren Solenoid Valve Core Ranges



The NEW Inline valve range

XF-Range V60-63



XF-Range V60-63 : Valves for all applications

- Compact design and high performance
- Two 3/2-way valves in one body
⇒ 2-in-1-valve
- New double pilot system
- Flexible manifold system
- True multipressure system
- Extensive accessories



XF-Range V60-63 : Valves for all applications

- High flow
- Short switching times
- Low power consumption (2 watt) as a standard
- Collected pilot exhaust air with the double pilot system
- Three manual override options
 - ⌚ with detent
 - ⌚ without detent
 - ⌚ without MO
- Separate versions with internal and external pilot air supply



XF-Range V60-63 : Design and Performance

Family

Product-Code

Size

- **XF5** ⇒ **V60** ⇒ **G1/8**
 - DN 5mm , 22mm wide , 750 l/min
- **XF8** ⇒ **V61** ⇒ **G1/4**
 - DN 8mm , 25mm wide , 1.300 l/min
- **XF13** ⇒ **V62** ⇒ **G3/8**
 - DN 13mm , 34mm wide , 2.600 l/min
- **XF18** ⇒ **V63** ⇒ **G1/2**
 - DN 18mm , 46mm wide , 5.500 l/min
- **Four thread types**
 - ① ISO G ② NPTF (③ PIF) (④ Namur)



XF-Range V60-63 : Competitor comparison

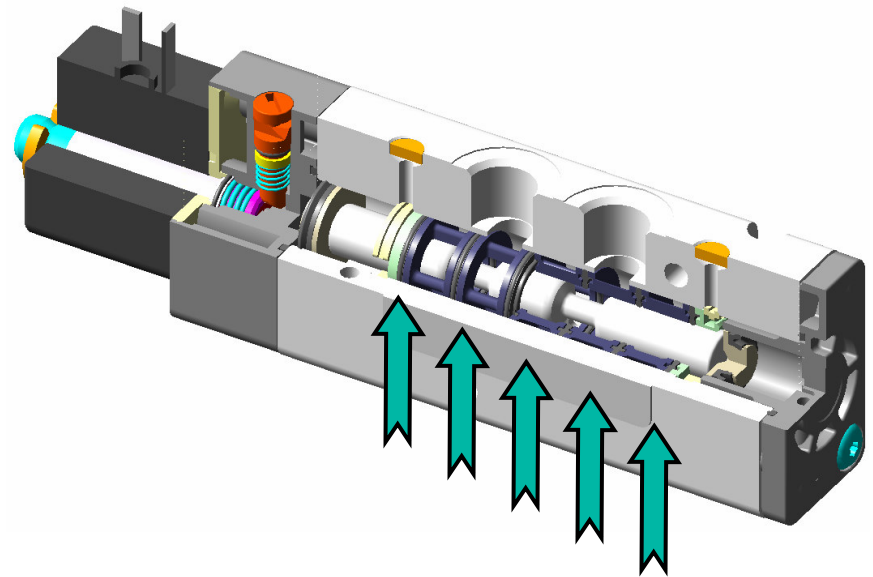
Feature	XF V60-63	Bosch (1)	Festo (2)	Parker	Flexroth	SMC (5)
3/2-WV-NC (sol/spring)	S/A	S/A	S	S/A	S/A	S/A
3/2-WV-NO (sol/spring)	S/A	S/A	S	---	S/A	S/A
3/2-WV (sol/sol)	S/A	S/A	---	S/A	---	---
2x 3/2-WV-NC/NC (sol/spring)	S/A	---	--- (3)	---	---	---
2x 3/2-WV-NO/NO (sol/spring)	S/A	---	--- (3)	---	---	---
2x 3/2-WV-NC/NO (sol/spring)	S/A	---	--- (3)	---	---	---
5/2-WV (sol/spring)	S/A	S/A	S/A	S/A	S/A	S/A
5/2-WV (sol/sol)	S/A	S/A	S/A	S/A	S/A	S/A
5/3-WV-APB	S/A	S/A	S/A	S/A	S	S/A
5/3-WV-COE	S/A	S/A	S/A	S/A (4)	S	S
5/3-WV-COP	S/A	S/A	S/A	S/A (4)	S	S
G1/8 , NG 4/5 --> [l/min]	750	700	900	600	900	(900) 500
G1/4 , NG 7/8 --> [l/min]	1.300	1.400	1.350	1.200	1.200	800
G3/8 , NG 12/13 --> [l/min]	2.600	---	3.000	---	---	--- (6)
G1/2 , NG 16/18 --> [l/min]	5.500	3300	---	---	4.000	--- (6)
Pressure range [bar]	-0,9 - 10	-0,9 - 10	-0,9 - 8/10	-0,9 - 10	-0,9 - 10	1-7
Power consumption [Watt]	2	4,5	1,5/2,5	4,8	4,8	<0,6
Double pilot versions	✓	---	--- (3)	---	---	---
Collected pilot exhaust	✓	G1/8	✓	✓	---	---
Manifold systems	✓	✓	✓	✓	✓	✓
Body material	Alu	Plastic	Alu	Alu	Alu	Alu

(1)	Double pilot valve and 2x3/2-way valves only available on valve islands
(2)	Air operated valves are not available on CPE-series Classic tiger series and Midi/Maxi series available as solenoid and air operated valves CPE-series needs special fittings due to the small sized bodies
(3)	On valve islands (terminal) available only
(4)	Not with G1/8
(5)	Solenoid and air operated valves in different sizes, divided onto different series
(6)	Old series, not in the official sales documentation (obsolete product)



XF-Range V60-63 : Valve technology

- Non-overlapping softseal system in form of a **Cartridge**
- Pressure balanced sealing system
- ☐ Valve system allows to throttle all ports !
- Cartridge as a design element for customised solutions
- Available for all functions



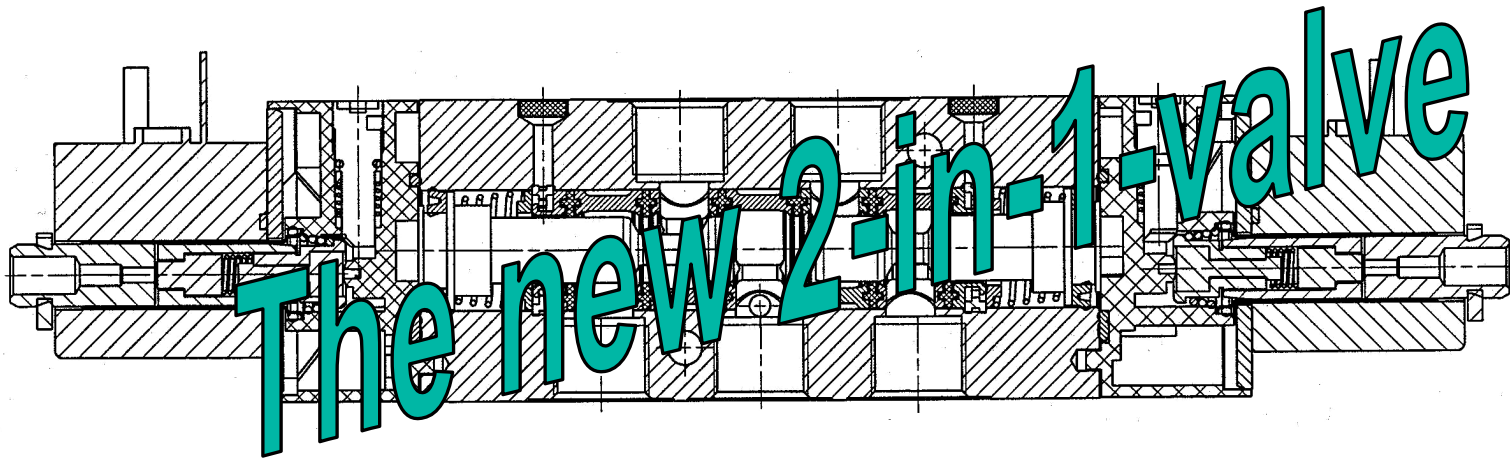
XF-Range V60-63 : Valve functions

- ✓ **3/2-WV-NC and NO , sol/spring**
 - ⌚ NC ... Normally closed
 - ⌚ NO ... Normally open
- ✓ **3/2-WV , sol/sol**
- ✓ **2x 3/2-WV-NC/NC , NO/NO , NC/NC**
- ✓ **5/2-WV sol/spring , sol/sol**
- ✓ **5/3-WV-APB , COE , COP**
 - ⌚ APB ... All ports blocked
 - ⌚ COE ... Central open exhaust
 - ⌚ COP ... Central open pressure



XF-Range V60-63 : Valve functions

2x 3/2-way valves



- Two 3/2-WV in 1 body
- Normally closed and normally open in any combination
 - ↳ NC/NC , NO/NO , NC/NO
- Restposition with air return

XF-Range V60-63 : Valve functions

➤ Solenoid operated

- ⌚ with internal pilot air supply
- ⌚ with external pilot air supply
- ⌚ single pilot with changeable coil
- Double pilot with integrated LEDs
- body material: polyamid with glass fibre

➤ Air operated

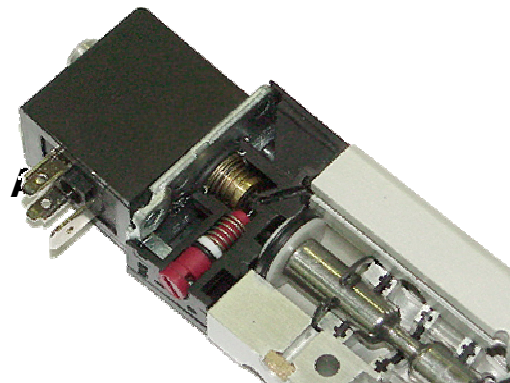
- Aluminium body
- Threat size M5



XF-Range V60-63 : Pilot variants

Single-Pilot

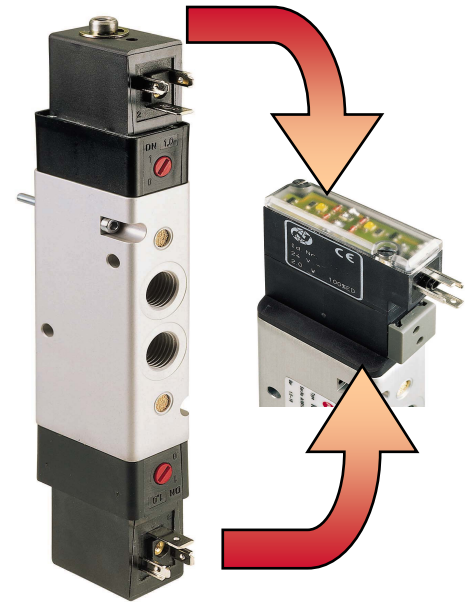
- Pilot valves and coils from IMI Webber
- Changeable coils
- Coils with connector types according to
 - ⌚ DIN 43650 type B
 - ⌚ industrial standard (22 mm)
 - ⌚ DIN 43650 type A ☒ on request
- Power consumption 2 Watt (1,5 Watt with type A)
- Circlip-fastening
- Threat size M5 at the exhaust



XF-Range V60-63 : Pilot variants

Double-Pilot

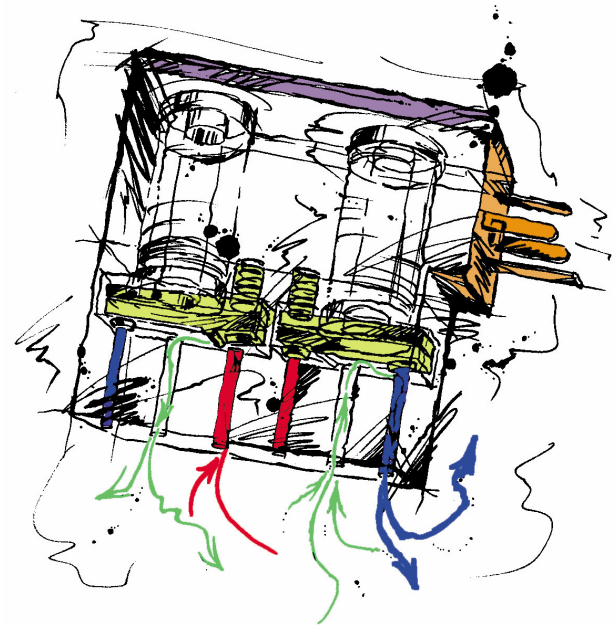
- 2 pilot valves in 1 body
- Integrated LEDs for side 12 and 14
- Integrated surge suppression
- Collected pilot air exhaust as a standard
- 24 VDC
- Connector type DIN 43650 type C (4-pin)
- 3 manual override options
 - ⌚ with detend (slider)
 - ⌚ without detend (push button)
 - ⌚ without MO



XF-Range V60-63 : Pilot variants

Benefits

- ❏ Reduced installation space
- ❏ Reduced electrical installation requirements
- ❏ Indication of switching conditions
- ❏ Electrical safety
- ❏ Available for all valve functions
- ❏ Suitable for food and pharmaceutical industries

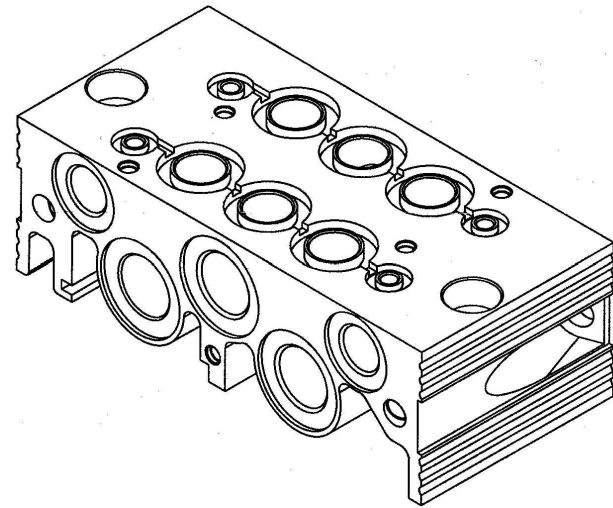


XF-Range V60-63 : Sub-base system

Modular sub-bases

- Single sub-base for 2 valves
- Expandable in steps of 2
- Two different threats
 - ① ISO G ② NPTF
- DIN rail or surface mounting
- Separate lines for external pilot air supply and collected pilot exhaust air

- Inclusive accessories (screws, seal)

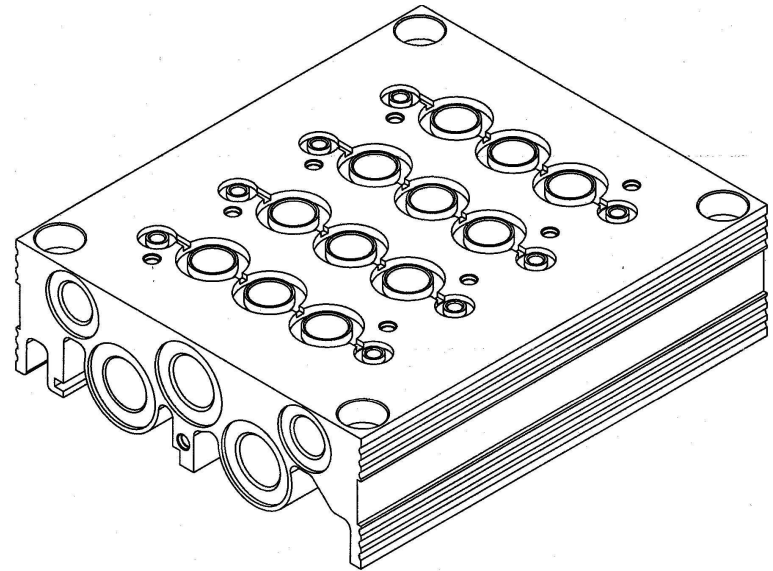


XF-Range V60-63 : Sub-base system

Fixed length manifold

- Fixed length manifold up to 4 - 20 stations in steps of 2
- Two different threats
 - ① ISO G ② NPTF
- DIN rail or surface mounting
- Separate lines for external pilot air supply and collected pilot exhaust air

- Inclusive accessories (screws, seal)



XF-Range V60-63 : Accessories

Plugs

- **Plugs acc. to DIN 43650 type B (22mm)**
 - with and without surge suppression
- **Plugs acc. to industrial standard (22mm)**
 - with and without surge suppression
- **Plugs acc. to DIN 43650 type C (4 pin = 3 + ground)**



 **All standard-plugs possible**

XF-Range V60-63 : Accessories

Cartridge

- **Design element**
 - ↪ for all valve functions available
- **Inclusive all technical support and documentation**

- **Consists of**
 - ⌚ Spacers and end rings (plastic)
 - ⌚ Seal (NBR)
 - ⌚ Spool (stainless steel)
 - ↪ Plastic tube



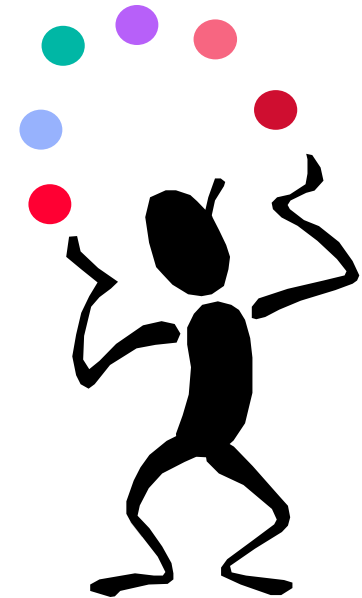
XF-Range V60-63 : Accessories

Blanking plate

- For Sub-bases modular and fixed length
- Inclusive screws

Blanking plug

- For Sub-bases modular and fixed length
- For splitting line 1 and exhaust lines 3 + 5
- Inclusive seal



XF-Range V60-63 : Features and Benefits

Features

- Complete valve range
- 2-in-1-valve
- Double pilot
- Low power coils
- Collected pilot exhaust air
- Flexible sub-base system
- Integrated LEDs and surge suppression

Benefits

- Meets your applications
- Reduced installation space
- Further reducing installation space and wiring costs
- Low running costs and reduced heat rise
- Optimised for sensible applications, e.g. in food and pharmaceutical industries
- Optimised installations space
- Easy integration into all forms of control

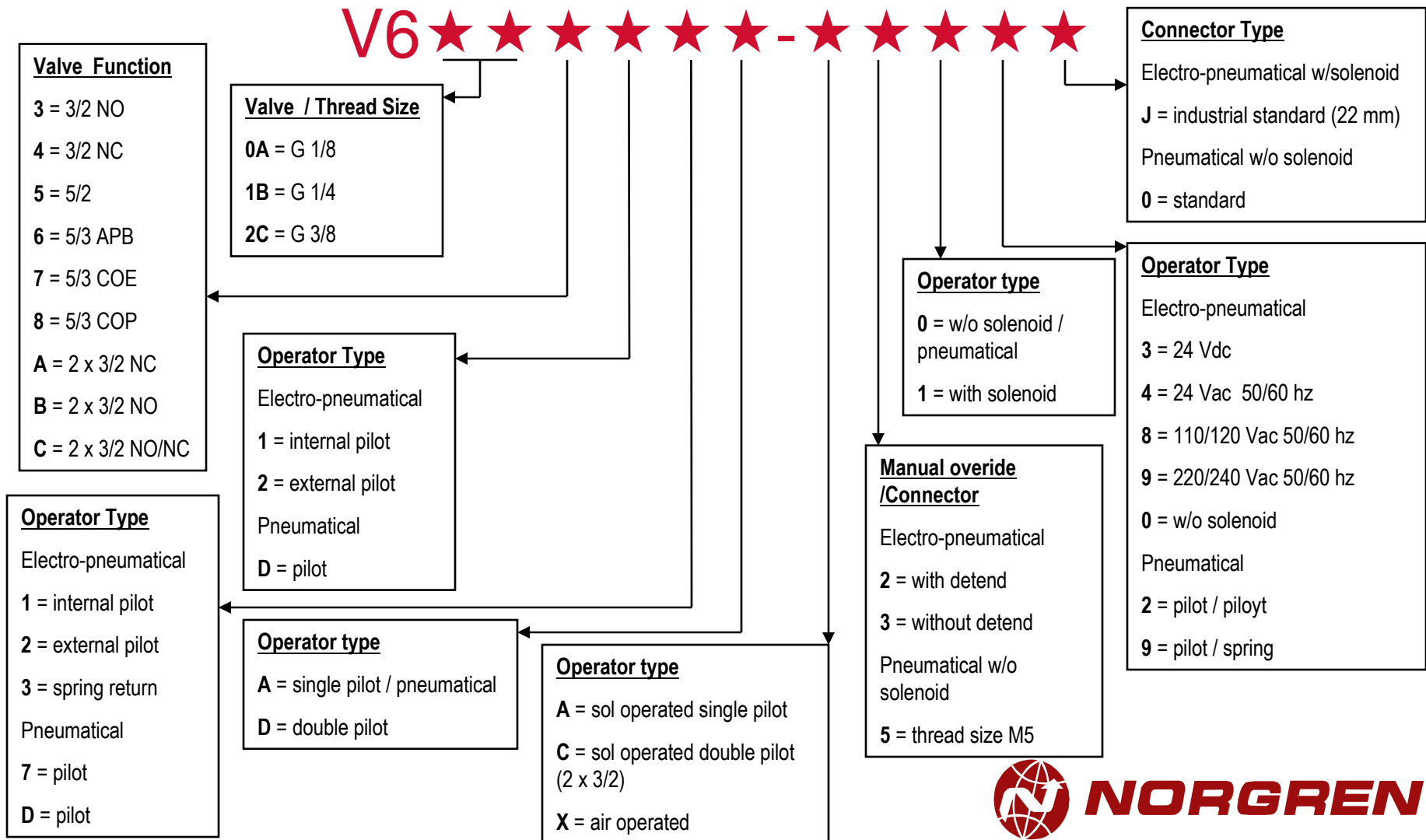


XF-Range V60-63 : The NEW Inline valve range

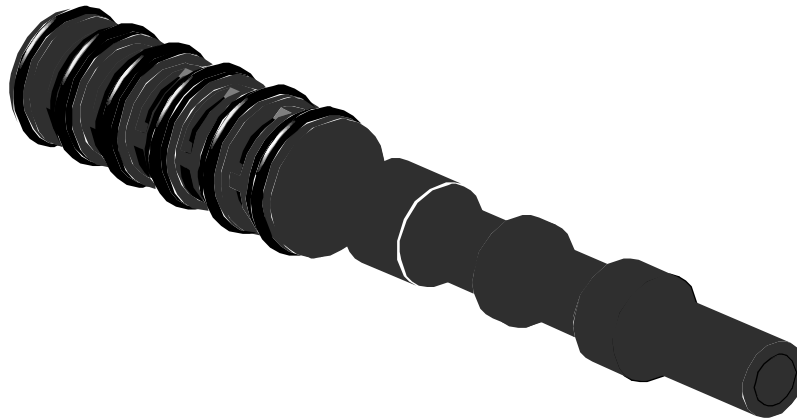
**A complete valve range for all
applications ...**

**many-sided and
intelligent !!**

How to Order ...



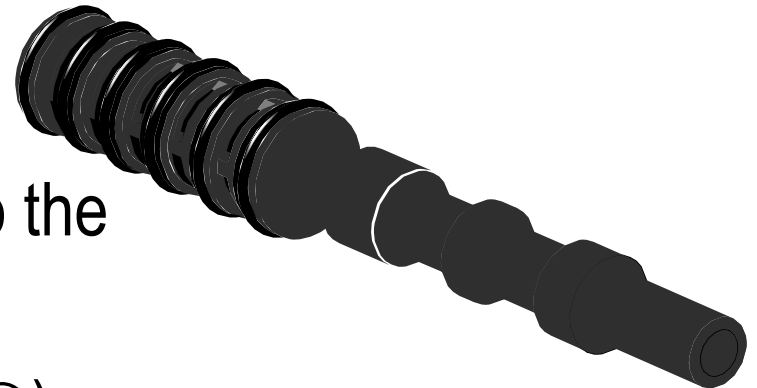
IMI Norgren's Glandless Technology Presentation



Glandless Spool Technology

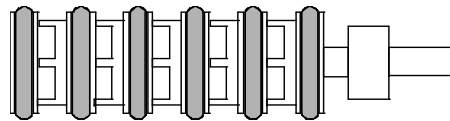
Based on a hard anodised aluminium spool and sleeve with Teflon impregnation

- Precision matched set
- Machined straight and parallel to the highest quality and finish
- Unique Teflon coating (NITUFF®)
- Lightweight and non-corrosive
- Simple and compact design



Fast & Constant Response

- Lightweight aluminium spool and sleeve
- Glandless design and Teflon coating
- Pre-lubricated spool and sleeve assembly
- Typically faster than steel versions
- Only one moving part in valve body



Robust and Reliable.....

- Harsh, industrial environments
- No minimum number of operating cycles
- 100% product testing
- Tetra pak, Sweden: **100%** reliable

Corrosion Resistant.....

- Unique Teflon coating
- Aluminium spool and sleeve
- No rusting or 'sticking'



Long, trouble-free life.....

- 100-200 million cycles
- Durable Teflon coating
- Pre-lubricated spool and sleeve
- Precision engineering & design



*Douwe Edgberts, Belgium:
90 valves reached 250 million
cycles in eleven years and are
still working perfectly!*



Application flexibility.....

Flexible Air Supply

- Lubricated, non-lubricated *and* dry air
- Airline filtration only 40 µm
- Low pressure and vacuum applications

Multi purpose design

- Pressure/vacuum into any port for any combination of circuit function

Maximum Flow

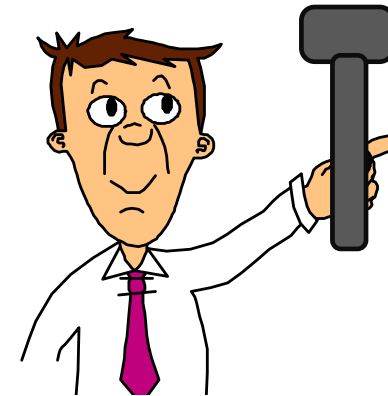
- Slots in sleeve



The '***FIT & FORGET***' solution.....

Quick & Easy Installation

- Captive mounting screws
- Range of bases and manifolds
- Compact and neat
- Fast, flexible and user friendly.



Minimal Maintenance

- No rusting or corrosion
- Simple design
- Problem-free operation

Offering a *complete* Product and Accessory range

- 1/8" in-line to sub-base mounted ISO 5599/1 #1, #2 #3
- Proportional and slow start valves
- Line and CNOMO versions
- Integral flow regulators
- Range of base systems; VDMA 24345, Universal, MULTI*STAR
- Range of Accessories; blanking plates, sandwich pressure regulators.....
- Manual overrides, low power solenoids

Range



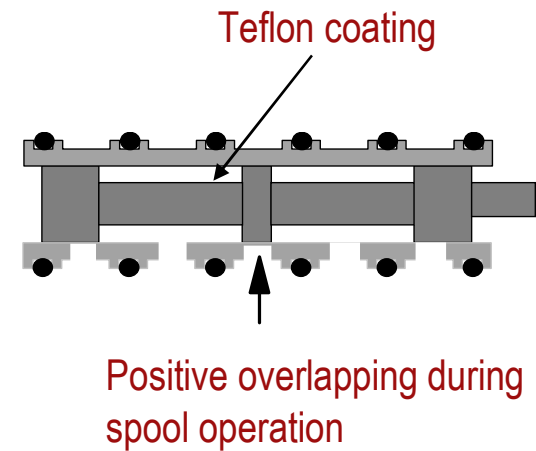
Midi Star



ISO Star

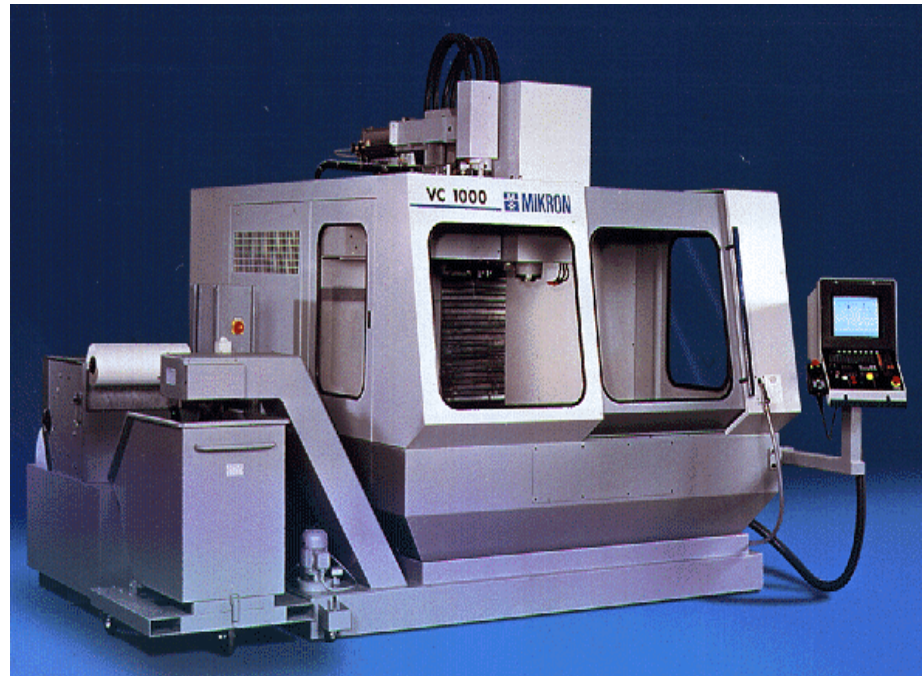
and above all... Cost Effectiveness

- *Minimal and constant* air consumption (typically 20-40 ml/min)
- Integral flow regulators
- Minimum pilot pressures
- Low power solenoids
- Simple and low cost installation
- Minimal maintenance



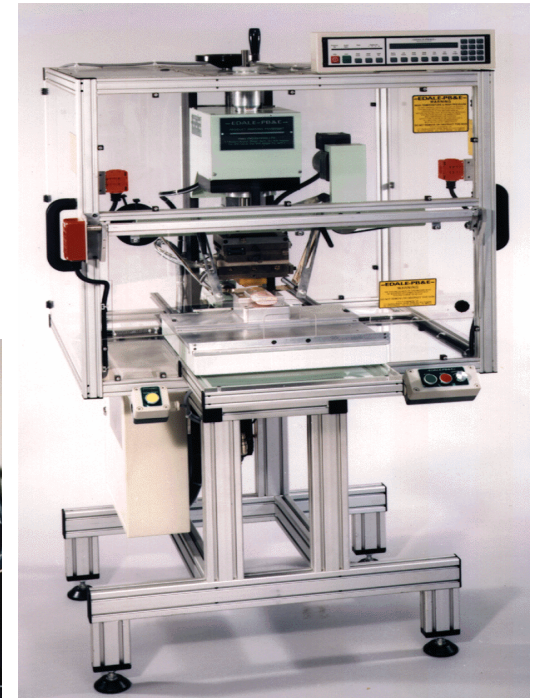
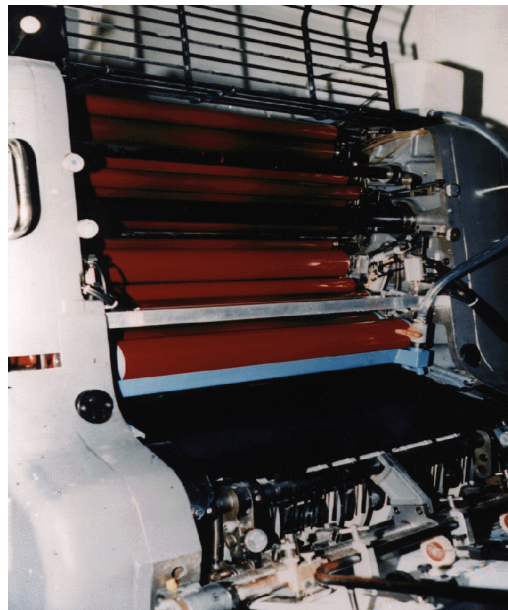
Meeting demands from a range of industries

- Paper & Printing
- Automotive
- Food Processing
- Packaging
- Material Handling
- Textiles
- Chemicals & Plastics
- Machine Tool



Performing in a variety of applications

- Automated assembly
- Painting
- Robotics
- Sorting systems
- Material handling
- Conveyor systems
- Process control
- Clamping



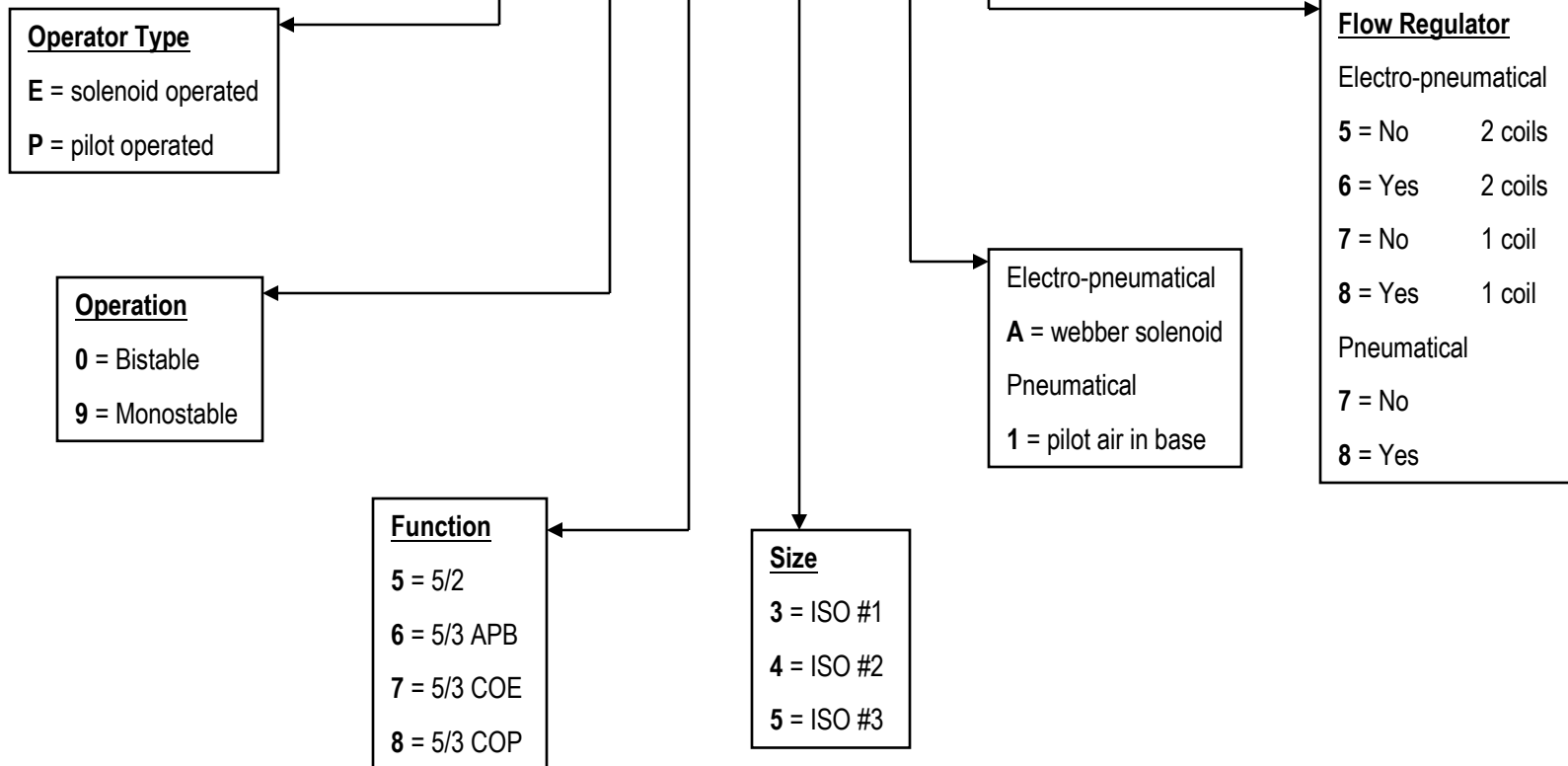
But why choose Norgren glandless valves?

- Low air consumption
- Use on lubricated, non-lubricated and dry air
- NO minimum number of operating cycles
- Lightweight; fast and constant response
- Corrosion resistant
- (40 Coarse air filtration μm)
- Lightweight and fast response
- Integral flow regulators
- Compact & neat installations



How to Order ...

SX★-★★7★-★★0-00B



End

